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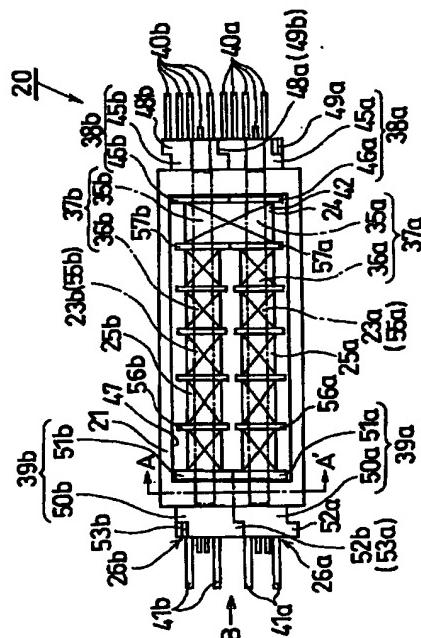
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(54)【発明の名称】 インバータトランス

(57)【要約】

【課題】複数本のCFLの点灯を、部品数の増加を必要最小限に抑えて行なえる小型で、かつ低廉化を図ることができるインバータトランスを提供する。

【解決手段】第1、第2ボビン26a, 26bは、それぞれ二次側巻線25a, 25bを巻回した状態で一体化され、各コア挿入孔55a, 55bにはI形状コア23a, 23bが挿入され、一体化された第1、第2ボビン26a, 26bには一次側巻線24が共通に巻回されている。I形状コア23a, 23bと非磁性材のシート27との間には口字状コア21が介在され、所定の漏洩インダクタンスをもつように磁気的に結合されている。2本のCFLの駆動を、I形状コア23a, 23bに対応して2つの口字状コアを設ける場合に比して、一つの口字状コア26を設けて果たすことができ、部品点数が削減されると共に、装置の小型化が図れ、ひいては装置の低廉化を図ることができる。



【特許請求の範囲】

【請求項1】 直流を交流に変換するインバータ回路に備えられ、一次側に入力された交流電圧を昇圧して二次側に出力するインバータトランスであって、略口の字状の外側コアと、該外側コアの内側に配置して前記外側コアに所定の漏洩インダクタンスをもつように接合される略I形状の複数個の内側コアと、該複数個の内側コアに対応して設けられる複数個の二次側巻線及び該複数個の二次側巻線に共通して設けられる一次側巻線と、略筒状をなし前記複数個の二次側巻線に対応して複数個設けられ、内側に前記複数個の内側コアをそれぞれ挿入し、外側に前記複数個の二次側巻線をそれぞれ巻回する複数個のボビンとを備え、前記各複数個のボビンの一端側には前記一次側巻線用の一次側端子台を、又、他端側には前記二次側巻線用の二次側端子台を備え、前記複数個のボビンは、それぞれ二次側巻線を巻回した状態で結合されて一体化され、かつ一体化される前記複数個のボビンに前記一次側巻線が巻回されることを特徴とするインバータトランス。

【請求項2】 請求項1に記載の構成において、前記複数個のボビンは、それぞれの一次側端子台が結合しあつそれ各自的二次側端子台が結合することにより一体化され、前記各一次側端子台の結合部には互いに嵌合可能に突起及び溝が形成されると共に、前記各二次側端子台の結合部には互いに嵌合可能に突起及び溝が形成されたことを特徴とするインバータトランス。

【請求項3】 請求項1または請求項2に記載の構成において、前記外側コアには、前記一体化される複数個のボビンの一次側端子台の一部及び二次側端子台の一部をそれぞれ嵌合するコア側溝を設けたことを特徴とするインバータトランス。

【請求項4】 請求項1から請求項3までのいずれかに記載の構成において、前記一体化される複数個のボビンの一次側端子台及び二次側端子台には、前記外側コアに形成した嵌合用溝又は前記外側コアの外側部に嵌合する嵌合用突起を設けたことを特徴とするインバータトランス。

【請求項5】 請求項1から請求項4までのいずれかに記載の構成において、内側コアの一端部には、略L字型をなす屈曲部が備えられていることを特徴とするインバータトランス。

【請求項6】 請求項1から請求項5までのいずれかに記載の構成において、前記複数個のボビンは同一形状をなすことを特徴とするインバータトランス。

【発明の詳細な説明】

【0001】

【発明の属する技術分野】 本発明は、液晶ディスプレイ

の画面照明用光源を点灯するインバータ回路の出力段に用いる昇圧用インバータトランスに関するものである。

【0002】

【従来の技術】 近年、パーソナルコンピュータ等のディスプレイ装置として、陰極線管、所謂CRTに代り、液晶ディスプレイ（以下、LCDと略称する。）が広く使用されるようになってきた。このLCDはCRTと異なり、発光機能を持たないので、バックライト方式やフロントライト方式の画面照明用の光源を必要としている。また、このようなLCDの画面を高輝度に保つために、上記の光源として、二本以上の冷陰極線管ランプ（以下、CFLという。）を使用し、それらCFLを同時に放電、点灯させることがある。

【0003】 一般に、この種のCFLの放電、点灯には、12V程度の直流入力電圧をロイヤー（ROYER）発振回路を介して、トランス（インバータトランス）の一次側に交流電圧として入力し、その二次側に、放電開始時に60kHz、1600V程度の高周波電圧を発生させるインバータ回路が用いられる。

【0004】 このインバータ回路はCFLの放電後、インバータトランスの二次側電圧をCFLの放電を維持するのに必要な600V程度の電圧まで下げるよう制御する。この電圧制御には、通常、パルス幅（PULSE WIDTH MODULATION、以下、PWMという。）制御が用いられている。

【0005】 このようなインバータ回路に使用されるインバータトランスとしては、従来から磁心にI形状コアを用いた開磁路構造のものと、磁心を閉磁路構造としたものとがある。図22に開磁路構造のインバータトランスの等価回路を示す。この図において、1は、損失がない1:nの理想的昇圧トランス（インバータトランス）、L₁は漏洩インダクタンス、L₂は二次側巻線のインダクタンスである。この理想的昇圧トランス（開磁路構造のインバータトランス）1では、接続されるCFL2が一本の場合は漏洩インダクタンスL₁がパラストインダクタンスの役割を果たし、正常な放電を行なう。

【0006】 しかし、CFL2をインバータトランス出力端子Tに二本並列に接続すると、何れか一方のCFL2が先に放電すると、漏洩インダクタンスL₁によりインバータトランス出力端子Tの電圧が降下して他方のCFL2が放電不能となる。図23に磁心にI形状コア3を用いた開磁路構造のインバータトランス1の例を示す。図23で筒状のボビン4に軸方向に延びて形成される空孔部5に、点線で示すように、I形状コア3が挿入されている。

【0007】 ボビン4には、一次側巻線6、二次側巻線7が巻回されており、一次側巻線6の端子ピン8を搭載した端子台9、二次側巻線7の端子ピン10を搭載した端子台11が設けられている。また、二次側に誘起される電圧は高圧なので、二次側巻線7はボビン4の仕切板

12により分割して巻回され、沿面放電を阻止している。上記の磁心にI形状コア3を用いた開磁路構造のインバータトランス1は、図24に示すように、略口字形状のコア13とI形状コア3を組合せて磁心を構成し、I形状コア3を挿入するボビン14に巻線を巻回して構成される閉磁路構造のインバータトランス1Aに比べて、構造は簡単であるが、漏洩インダクタンスが大きいので、複数本のCFLを接続した場合は、一本のみ点灯し、他は点灯不能となる現象が起こることがある。

【0008】図24に示す閉磁路構造のインバータトランス1Aは、筒状のボビン14の空孔部（符号省略）に、I形状コア3を挿入し、ボビン14に一次側巻線6と二次側巻線7を巻回し、I形状コア3をロ字形状のコア13の嵌合溝15に嵌合した構造である。なお、図24に示すインバータトランス1Aでは閉磁路構造の磁心を構成するために用いられたロ字形状のコア13及びI形状コア3を用い、両者間に、空隙を設けた開磁路構造とし、漏洩インダクタンスを調整するインバータトランスもあるが、複数本のCFLを並列に接続した場合、上述したのと同様に複数本のCFLの全てについて点灯できないことが起こり得る。従って、複数本のCFLを点灯させる際、開磁路構造のインバータトランスを用いる場合には、CFL一本に対して、一つのインバータトランスが必要となる。

【0009】高輝度対応のLCDでの画面照明におけるように、多数のCFLを用いる場合は、複数個のインバータトランスが必要となり、インバータトランス全体が大型化すると共にコストも上昇することになる。

【0010】また、磁心にI形状コアを用いた開磁路構造のインバータトランスは、構造は簡単であるが、特に漏洩インダクタンスが大きいので、電圧、電流に位相差が生じ、所謂、無効電力が増加し電力効率を著しく低下させるという問題もあった。他方、磁心を開磁路構造としたインバータトランスは、二本以上のCFLを接続し、それらCFLの全てを放電、点灯させることができるものである。

【0011】しかし、この場合、何れかのCFLが放電し、そのCFLの内部インピーダンスの低下により放電電流が流れ、負荷電流が増加すると、閉磁路構造では漏洩インダクタンスが小さいものの、インバータトランスの出力端子電圧が低下する。このため、他のCFLの放電条件に影響を与え、各CFLの放電動作にばらつきを生じさせることがある。また、CFLのインピーダンスは負性抵抗特性をもつて、一つのCFLが放電、点灯すると、急激にCFLのインピーダンスが減少して電流が激増し、巻線の断線など、インバータトランスの損傷を生じさせることもある。

【0012】このため、閉磁路構造のインバータトランスには漏洩インダクタンスが小さいので、図25に示すように、出力端子Tと各CFL2の間にバラストコンデ

ンサCbを挿入する方法を用いている。しかし、この方法では挿入したバラストコンデンサCbにより電圧、電流に位相差が生じ、所謂、無効電力の増加により電力効率を著しく低下させると共に、部品点数の増加、高価な高耐圧のバラストコンデンサCbによるコスト上昇などの問題があった。

【0013】

【発明が解決しようとする課題】上述したように、従来のインバータトランスでは、開磁路構造のものにあっては、インバータトランスの個数がCFLの本数と1対1の関係で増加すると、インバータトランス全体として大型化し、又、コストの上昇を招くという問題点があった。また、閉磁路構造のものにあっては、1つのインバータトランスで複数本のCFLを放電させ得るが、CFL間で放電動作にばらつきを生じさせたり、過電流によりインバータトランスを損傷させる等の問題があった。CFL間での放電動作のばらつきには、各CFLにバラストコンデンサを直列に挿入するという対処方法があるが、これによる電力効率の低下、部品点数やコストの増大を招くという問題があった。

【0014】本発明は、上記事情に鑑みてなされたもので、複数本の冷陰極線管ランプ（CFL）の点灯を、部品数の増加を必要最小限に抑えて行なえる小型で、かつ低廉化を図ることができるインバータトランスを提供することを目的とする。

【0015】

【課題を解決するための手段】請求項1に記載の発明は、直流を交流に変換するインバータ回路に備えられ、一次側に入力された交流電圧を昇圧して二次側に出力するインバータトランスであって、略口の字状の外側コアと、該外側コアの内側に配置して前記外側コアに所定の漏洩インダクタンスをもつよう接合される略I形状の複数個の内側コアと、該複数個の内側コアに対応して設けられる複数個の二次側巻線及び該複数個の二次側巻線に共通して設けられる一次側巻線と、略筒状をなし前記複数個の二次側巻線に対応して複数個設けられ、内側に前記複数個の内側コアをそれぞれ挿入し、外側に前記複数個の二次側巻線をそれぞれ巻回する複数個のボビンとを備え、前記各複数個のボビンの一端側には前記一次側巻線用の一次側端子台を、又、他端側には前記二次側巻線用の二次側端子台を備え、前記複数個のボビンは、それぞれ二次側巻線を巻回した状態で結合されて一体化され、かつ一体化される前記複数個のボビンに前記一次側巻線が巻回されることを特徴とする。

【0016】請求項2に記載の発明は、請求項1に記載の構成において、前記複数個のボビンは、それぞれの一次側端子台が結合しつつそれぞれの二次側端子台が結合することにより一体化され、前記各一次側端子台の結合部には互いに嵌合可能に突起及び溝が形成されると共に、前記各二次側端子台の結合部には互いに嵌合可能に

突起及び溝が形成されたことを特徴とする。請求項3に記載の発明は、請求項1または請求項2に記載の構成において、前記外側コアには、前記一体化される複数個のボビンの一次側端子台の一部及び二次側端子台の一部をそれぞれ嵌合するコア側溝を設けたことを特徴とする。請求項4に記載の発明は、請求項1から請求項3までのいずれかに記載の構成において、前記一体化される複数個のボビンの一次側端子台及び二次側端子台には、前記外側コアに形成した嵌合用溝又は前記外側コアの外側部に嵌合する嵌合用突起を設けたことを特徴とする。

【0017】請求項5に記載の発明は、請求項1から請求項4までのいずれかに記載の構成において、内側コアの一端部には、略し字型をなす屈曲部が備えられていることを特徴とする。請求項6に記載の発明は、請求項1から請求項5までのいずれかに記載の構成において、前記複数個のボビンは同一形状をなすことを特徴とする。

【0018】

【発明の実施の形態】本発明の第1実施の形態に係るインバータトランジスタを図1ないし図8に基づいて説明する。なお、図22ないし図25と同等の部分、部材については図22ないし図25と同等の符号を付し、その説明は、適宜、省略する。図1は、本発明の第1実施の形態に係るインバータトランジスタの組立工程を理解するためにインバータトランジスタを模式的に示した分解斜視図である。

【0019】図1～図3に示すように、インバータトランジスタ20は、略口字形状のコア（以下、口字状コアといふ。）21及びこの口字状コア21と共に磁心22を構成する2本のI形状コア23a, 23bと、1つの一次側巻線24、2つの二次側巻線25a, 25b及び後述する帰還用巻線42（図7）と、2つの二次側巻線に対応して設けられ一次側巻線24、帰還用巻線42及び2つの二次側巻線25a, 25bを巻回する2本の矩形筒状のボビン26a, 26bとから大略構成されている。インバータトランジスタ20は、後述するように一体化されるボビン26a, 26bに、図1（イ）で示すように、I形状コア23a, 23bをそれぞれ挿入し、（ロ）で示すように、I形状コア23a, 23bの上に後述する非磁性材のシート27を載置し、さらに、この上に、

（ハ）で示すように、口字状コア21を載置して組立てられる。なお、図1では、便宜上、図3で示される一次側突起48a, 48b、一次側溝49a, 49b、二次側突起52a, 52b及び二次側溝53a, 53b等の記載は省略している。

【0020】2本のボビン26a, 26bは、同一形状に構成されている。2本のボビン26a, 26bのうち、図3下側のものを第1ボビン26aといい、また、図3上側のものを第2ボビン26bという。また、便宜上、2本のI形状コア23a, 23bのうち第1ボビン26aに設けられるものを23aで示し、第2ボビン2

6bに設けられるものを23bで示す。本実施の形態では、口字状コア21が外側コアを構成し、I形状コア23a, 23bが内側コアを構成している。第1、第2ボビン26a, 26bは後述するように結合されて一体化されるようになっている。2つの二次側巻線25a, 25bは、第1、第2ボビン26a, 26bにそれぞれ巻回され、一次側巻線24は、一体化された第1、第2ボビン26a, 26bに共通に巻回されている。

【0021】2本のI形状コア23a, 23bは、後述するように口字状コア21に非磁性材のシート27を介して接合され所定の漏洩インダクタンスをもつようになされている。口字状コア21は、図1及び図4に示すように、2つの四角柱状の短辺部28及び2つの四角柱状の長辺部29からなっている。口字状コア21の両短辺部28的一面側には、図1、図2及び図4に示すように後述する端子台（一次側端子台38a, 38b及び二次側端子台39a, 39b）が嵌合される溝（以下、端子台用嵌合溝といふ。）30が形成されている。

【0022】次に、第1、第2ボビン26a, 26bの構成を説明する。なお、上述したように第1、第2ボビン26a, 26bは、同一形状に構成されており、以下、第1ボビン26aについて、その構造を説明し、第2ボビン26bについては、第1ボビン26aと対比して補足的に説明する。なお、第2ボビン26bの各構成要素の説明は、後述するように適宜省略する。

【0023】第1ボビン26aは、図3に示すように、一次側巻線24が巻回される一次側巻線部35a及び二次側巻線25aが巻回される二次側巻線部36aからなる長手状の胴部37aと、胴部37aの一端側及び他端側にそれぞれ設けられる一次側端子台38a及び二次側端子台39aとを備えている。一次側端子台38aの一面部（図3右側）には、5本の一次側巻線端子ピン40aが設けられている。5本の一次側巻線端子ピン40aは、図7に示すように、そのうち3本がインバータトランジスタ20の一次側のアッシュブル接続用（すなわち一次側巻線24の始端61、終端62及び中間タップ63用）とされ、また、2本が帰還用巻線42用（すなわち帰還用巻線42の始端64及び終端65用）とされている。帰還用巻線42は、一次側巻線24と略同等位置（図1及び図3参照）に配置され、その両端部が一次側巻線端子ピン40a, 40bの何れか2本のピンに接続されている。なお、帰還用巻線42について図1及び図3等への図示は省略する。また、二次側端子台39aの一面部（図3左側）には、2本の二次側巻線端子ピン41aが設けられている。

【0024】一次側端子台38aは、図1及び図3に示すように、一次側巻線端子ピン40aが設けられる矩形の一次側端子台本体45aと、この一次側端子台本体45aの胴部37aとの接続側に形成される立上り部（以下、一次側端子台立上り部といふ。）46aとから大略

構成されている。一次側端子台38aは、側面視、略L字形をなしている。また、一次側端子台38aは、その幅寸法（図3上下方向の長さ）が口字状コア21の矩形の孔47の幅寸法（図3上下方向の長さ）の約半分の長さとされている。

【0025】一次側端子台本体45aにおける一次側端子台立上り部46a側の面部（図3紙面表側）でかつ一次側巻線端子ピン40aが設けられている側の両端部のうち一方（図3上側）には、側面視略L字形の突起（以下、一次側突起という。）48aが形成され、他方（図3下側）には、一次側突起48aに沿う形状の溝（以下、一次側溝という。）49aが形成されている。

【0026】二次側端子台39aは、図1及び図3に示すように、二次側巻線端子ピン41aが設けられる矩形の二次側端子台本体50aと、ボビン本体の胴部37aとの連接側に形成される立上り部（以下、二次側端子台立上り部という。）51aとから大略構成されている。二次側端子台39aは、側面視、略L字形をなしていない。また、一次側端子台38aは、その幅寸法（図3上下方向の長さ）が口字状コア21の矩形の孔47の幅寸法（図3上下方向の長さ）の約半分の長さとされている。

【0027】二次側端子台本体50aにおける二次側端子台立上り部51a側の面部（図3紙面表側）でかつ二次側巻線端子ピン41aが設けられている側の両端部のうち一方（図3下側）には、図2、図3及び図5に示すように、側面視略L字形の突起（以下、二次側突起という。）52aが形成され、他方（図3上側）には、二次側突起52aに沿う形状の溝（以下、二次側溝という。）53aが形成されている。

【0028】第1ボビン26aは、第2ボビン26bと一体化され、一次側端子台立上り部46aから二次側端子台立上り部51aまでの部分が、口字状コア21の孔47内に配置され、一次側端子台本体45aにおける一次側端子台立上り部46a側の部分及び二次側端子台本体50aにおける二次側端子台立上り部51a側の部分が口字状コア21の端子台用嵌合溝30に嵌合されるようになっている。

【0029】第1ボビン26aには、一次側端子台本体45aから二次側端子台本体50aの途中の部分まで延びる孔（以下、コア挿入孔という。）55aが形成されており、I形状コア23aを挿入するようにしている。コア挿入孔55aの一次側端子台本体45aの上面側部分（図3紙面表側）は開口し、また二次側端子台本体50aにおける二次側端子台立上り部51a側の上面側部分（図3紙面表側）は開口している。

【0030】第1ボビン26aは、上述したように第2ボビン26bと一体化されて一次側端子台38a及び二次側端子台39aが口字状コア21の端子台用嵌合溝30に嵌合されるが、口字状コア21の短辺部28とコア

挿入孔55aに挿入されたI形状コア23aとの間に、図1及び図6に示すように、前記非磁性材のシート27が介在されるようになっている。

【0031】二次側巻線25aは、第1ボビン26a（I形状コア23a）の軸方向に沿って巻回されるが、高電圧を発生するため、その軸方向で複数個（本実施の形態では5つ）のセクションに分割され、各セクション間には絶縁性の仕切板56aが設けられ、沿面放電の阻止に必要な沿面距離が保持されている。仕切板56aには図示しない切欠が形成されており、仕切板56aを間にした両セクションの二次側巻線25aは、この切欠を通して接続されている。

【0032】一次側端子台38aには、一次側巻線24から一次側巻線端子ピン40aへ接続するリード線（図示省略）用の孔部（図示省略）または溝（図示省略）が設けられている。前記リード線は絶縁物で覆われた状態で孔部に通されるかまたは溝に埋め込まれ、充分な沿面距離及び絶縁性を保つようにしている。また、二次側端子台39aには、二次側巻線25aから二次側巻線端子ピン41aへ接続するリード線（図示省略）用の孔部（図示省略）または溝（図示省略）が設けられている。前記リード線は絶縁物で覆われた状態で孔部に通されるかまたは溝に埋め込まれ、充分な沿面距離及び絶縁性を保つようにしている。なお、二次側巻線25の接地側の巻線は、一次側巻線24の下部を貫通して一次側巻線端子ピン40aに接続する。この場合、第1ボビン26aに上述したリード線用の孔部または溝を設けなくて済み、第1ボビン26aの作製を容易に行えることになる。

【0033】第1ボビン26aの一次側巻線部35aと二次側巻線部36aとの間には仕切板（以下、一次側巻線部側仕切板という。）57aが設けられている。一次側巻線部側仕切板57aは、第1ボビン26aと直交する方向（図3上下方向）の長さが仕切板56aに比して長く設定されており、第1ボビン26aが第2ボビン26bと一体化された場合、図3に示すように、第2ボビン26bの一次側巻線部側仕切板57bと接するようになっている。なお、第1ボビン26aの仕切板56aについては、図3に示すように、第1ボビン26aが第2ボビン26bと一体化された場合、第2のボビン26bの仕切板56bとの間に隙間を形成する寸法とされている。

【0034】第2ボビン26bは、上述したように第1ボビン26aと同一形状に構成されている。このため、第2ボビン26bについては、第1ボビン26aと同等要素を示す符号中の「a」を「b」にえたものを符号として用いる（例えば第1ボビン26aの一次側巻線部35aに対応する第2ボビン26bの一次側巻線部は35bで示す。）こととし、個々の要素の説明は省略する。

【0035】第1ボビン26a及び第2ボビン26b

は、それぞれ二次側巻線25a, 25bを巻回した状態で結合されて一体化される。この場合、第1ボビン26aの一次側突起48a及び二次側溝53aに、それぞれ、第2ボビン26bの一次側溝49b及び二次側突起52bが嵌合することにより第1ボビン26a及び第2ボビン26bは、結合されて一体化されている。そして、このように一体化された第1ボビン26aの一次側巻線部35a及び第2ボビン26bの一次側巻線部35bに一次側巻線24が共通に巻回されている。この際、第1ボビン26aのコア挿入孔55aに挿入されるI形状コア23a及び第2ボビン26bのコア挿入孔55bに挿入されるI形状コア23bは、一次側巻線24と相互に均等の特性をもって電磁気的に結合するよう、前記非磁性材のシート27を介してロ字状コア21に電磁気的に同等な箇所に位置決めして固定されている。

【0036】前記一体化された第1ボビン26a及び第2ボビン26bは、上述した一次側巻線24、帰還用巻線42、二次側巻線25a, 25b及びI形状コア23a, 23bを備えた状態で、ロ字状コア21に固定されている。この場合、第1ボビン26a及び第2ボビン26bは、一次側端子台38a, 38bを一方の端子台嵌合用溝30(図1右側)に嵌合させ、かつ二次側端子台39a, 39bを他方の端子台嵌合用溝30(図1左側)に嵌合させて、接着剤によりロ字状コア21に固定されている。また、第1実施の形態では、第1ボビン26a及び第2ボビン26bは同一形状とされており、同一のモールド型を用いて製造でき、その分離コストを抑え装置の低廉化を図ることができる。なお、第1ボビン26a及び第2ボビン26bについて、同一形状になくてもよい。

【0037】上述したように構成されたインバータトランジスタ20では、二次側巻線25a, 25bのそれと一次側巻線24とは電磁気的結合が実現されていると共に、二次側巻線25a, 25bがそれぞれ電磁気的に等価なものとなっている。また、上述したように2本のI形状コア23a, 23b及びロ字状コア21は、両者間に非磁性材のシート27を介在させており、インバータトランジスタ20が一次側と二次側との間で、所定の漏洩インダクタンスをもつように電磁気的に結合されている。

【0038】上述したように構成したインバータトランジスタ20では、一次側巻線24に流す電流により発生した磁束 ϕ_1 , ϕ_2 (図示省略)は、I形状コア23a, 23bを同一方向に流れるため、それぞれの磁束は互いに干渉することなく、ロ字状コア21に流れる。このため、一次側巻線24が共通でありながら、それぞれ独立した二次側巻線25a, 25bをもつので、同時に2本のCFL2を駆動することができる。

【0039】また、2本のCFL2を駆動する場合、I形状コア23a, 23b(二次側巻線25a, 25b)に対応して2つのロ字状コアを設けるように構成すること

が考えられるが、このように構成した場合に比して、I形状コア23a, 23b(二次側巻線25a, 25b)に共通する一つのロ字状コア26を設けて2本のCFL2を駆動するように磁気的に結合しているので、ロ字状コアが一つで済む分、部品点数が削減されると共に、装置の小型化が図れ、ひいては装置の低廉化を図ることができる。

【0040】上述したインバータトランジスタ20に2本のCFL2を接続した回路を図7に示す。図7の回路では、インバータトランジスタ20及びロイヤー(ROYER)発振回路70でインバータ回路71が構成されている。図7において、直流電源72から電圧を供給されたロイヤー発振回路70は高周波電圧を発生する。インバータトランジスタ20は、この高周波電圧をブッシュブル形式の一次側巻線24に入力し二次側巻線25a, 25bで昇圧させる。そして、インバータトランジスタ20は、この昇圧された電圧を、二次側巻線25a, 25bに接続された2本のCFL2に印加し、2本のCFL2を放電、点灯させる。

【0041】図7のインバータトランジスタ20は、図8(a)の等価回路又は図8(b)の等価回路を簡略化した図8(b)の等価回路で示すことができる。図8中、CsはLCD(液晶ユニット)の寄生容量である。なお、図8(a)の等価回路で、インバータトランジスタ20のメインインダクタンスLsは一般的にCFLを点灯する周波数では、大きいインピーダンスとなるので、図8(a)の等価回路は図8(b)の等価回路に置換しても誤差は小さく、図7のインバータトランジスタ20の特性を調べる上で図8(b)の等価回路を用いても問題はない。

【0042】図8に示されるように、二次側巻線25a, 25bは、一次側巻線24を共通としているが相互に独立し、かつ電磁気的には相互に等価なものになっている。すなわち、図8(b)に示すように、各CFL2は各々、別個の漏洩インダクタンス L_{1^-} , L_{1^+} (ここで、 $L_{1^-} = L_1 + L_2$ である。)を介して所定の回路[図8(a)ではメインインダクタンスLsに相当する回路であり、簡略化された図8(b)では図示されていない。]と接続されているが、その所定の回路は、相互に等価の回路となっている。

【0043】上述したように、2本のCFL2のうち何れか一方が先に点灯しても、二次側巻線25a, 25bのうち他方のCFL2に対応する巻線の出力電圧(出力Tの電圧)は、降下しないので、他方のCFL2の放電条件に影響を与えない。すなわち、高耐圧をもつ高価なバラストコンデンサ(例えば図25のバラストコンデンサCb)を用いることなく、一方のCFL2を放電させ、点灯した後、他方のCFL2を正常に放電、点灯させ得る。

【0044】従来技術では、複数本のCFLの駆動のた

めに複数本のCFLに対応して複数個のインバータトランジスタを設けたり、あるいは複数本のCFLに対応してバラストコンデンサを設ける必要があったが、本第1実施の形態によれば、2本のCFL2の駆動を、バラストコンデンサを設げずに、かつ1個のインバータトランジスタ20で果たすことができる。このため、装置の簡素化及び低廉化を図ることができる。なお、このように2本のCFL2の駆動を、バラストコンデンサを設げずに、かつ1個のインバータトランジスタ20で果たし、装置の簡素化及び低廉化が図れることは、後述する第2～第6実施の形態にも同様に言えることである。

【0045】CFL2を点灯する場合、その周波数を、図8(b)の等価回路で示すインバータトランジスタ20の漏洩インダクタンス L_1 と寄生容量Csとで形成する共振周波数として、CFL2を駆動すると、CFL2は、通常1000V以上必要な二次側出力電圧として600V程度の電圧で点灯する。そして、二次側巻線25a, 25bにレアショートがあった場合、漏洩インダクタンスが変化するので、CFL2に電力を供給することができなくなり、出力電圧が低下し、発煙及び発火が生じない。

【0046】本第1実施の形態では、2本のCFL2を駆動し得るように、I形状コア(二次側巻線)としてはI形状コア23a, 23b(二次側巻線25a, 25b)のように2個、設けた場合を例にしたが、これに代えて、3本以上のCFL2を駆動し得るように、3本以上のI形状コア(二次側巻線)を設けるように構成してもよい。なお、このことは、後述する第2～第6実施の形態にも同様に言えることである。

【0047】次に、本発明の第2実施の形態に係るインバータトランジスタを図9ないし図13に基づいて説明する。なお、図1ないし図8、及び図22ないし図25と同等の部分、部材については図1ないし図8、及び図22ないし図25と同等の符号を付し、その説明は、適宜、省略する。第2実施の形態は、前記第1実施の形態に比して、第1、第2ボビン26a, 26bに代えて、第1、第2ボビン74a, 74bを備えている。第1実施の形態のロ字状コア21に対応するロ字状コア73は、図11に示すように、短辺部28の下部側にその長手方向に延びる切欠部75を形成している。さらに、図9～図13に示すように、ロ字状コア73の四隅には嵌合用溝76が形成されている。また、図11～図13に示すように、短辺部28の中央部の下部側には溝(以下、短辺部中央嵌合用溝という。)77が形成されている。

【0048】第1、第2ボビン74a, 74bには、図10に示すように、それぞれ一次側端子台78a, 78bが備えられている。一次側端子台78a, 78bは、それぞれ一次側端子台本体79a, 79b及びこれに連接する一次側端子台立上り部46a, 46bからなって

いる。一次側端子台立上り部46a, 46bは、その幅寸法(図10上下方向の長さ)がロ字状コア73の矩形の孔47の幅寸法(図10上下方向の長さ)の約半分の長さとされている。

【0049】一次側端子台本体79aにおける一面部(図10上側)には、矩形の突起(以下、一次側突起といふ。)80aが形成され、他面部(図10下側)には、図9にも示すように一次側突起80aに沿う形状の溝(以下、一次側溝といふ。)81aが形成されている。一次側端子台本体79bには、一次側突起80a及び一次側溝81aに対応して一次側突起80b及び一次側溝81bが設けられている。

【0050】さらに、第1、第2ボビン74a, 74bには、それぞれ二次側端子台82a, 82bが備えられている。二次側端子台82a, 82bは、それぞれ二次側端子台本体83a, 83b及びこれに連接する二次側端子台立上り部51a, 51bからなっている。一次側端子台立上り部51a, 51bは、その幅寸法(図10上下方向の長さ)がロ字状コア73の矩形の孔47の幅寸法(図10上下方向の長さ)の約半分の長さとされている。

【0051】二次側端子台本体83aにおける一面部(図10下側)には、矩形の突起(以下、二次側突起84aといふ。)が形成され、他面部(図10上側)には、二次側突起84aに沿う形状の溝(以下、二次側溝85aといふ。)が形成されている。二次側端子台本体83bには、二次側突起84a及び二次側溝85aに対応して二次側突起84b及び二次側溝85bが設けられている。

【0052】一次側端子台本体79aにおける一次側端子台立上り部46a側の部分の両側部〔一次側溝81aの近傍(図10下側)及び一次側突起80aの近傍(図10上側)〕には、ロ字状コア73の嵌合用溝76に嵌合する一次側嵌合用副突起(嵌合用突起)86aが設けられている。また、同様に一次側端子台本体79bにおける一次側端子台立上り部46b側の部分の両側部〔一次側突起80aの近傍(図10上側)及び一次側溝81aの近傍(図10下側)〕には、ロ字状コア73の嵌合用溝76に嵌合する一次側嵌合用副突起(嵌合用突起)86bが設けられている。

【0053】二次側端子台本体83aにおける二次側端子台立上り部51a側の部分の両側部〔二次側突起84aの近傍(図10下側)及び二次側溝85aの近傍(図10上側)〕には、ロ字状コア73の嵌合用溝76に嵌合する二次側嵌合用副突起(嵌合用突起)87aが設けられている。また、同様に二次側端子台本体83bにおける二次側端子台立上り部51b側の部分の両側部には、ロ字状コア73の嵌合用溝76に嵌合する二次側嵌合用副突起(嵌合用突起)87bが設けられている。

【0054】第2実施の形態の第1ボビン74a及び第

2ボビン74bは、それぞれ二次側巻線25a, 25bを巻回した状態で結合されて一体化される。この場合、第1ボビン74aの一次側突起80a及び二次側溝85aに、それぞれ、第2ボビン74bの一次側溝81b及び二次側突起84bが嵌合することにより第1ボビン74a及び第2ボビン74bは、結合されて一体化されている。そして、このように一体化された第1ボビン74aの一次側巻線部35a及び第2ボビン74bの一次側巻線部35bに一次側巻線24が共通に巻回されている。この際、第1ボビン74aのコア挿入孔55aに挿入されるI形状コア23a及び第2ボビン74bのコア挿入孔55bに挿入されるI形状コア23bは、一次側巻線24と相互に均等の特性をもって電磁気的に結合するように、前記非磁性材のシート27を介してロ字状コア73に電磁気的に同等な箇所に位置決めして固定されている。

【0055】前記一体化された第1ボビン74a及び第2ボビン74bは、上述した一次側巻線24、帰還用巻線42(図7参照)、二次側巻線25a, 25b及びI形状コア23a, 23bを備えた状態で、ロ字状コア73に固定されている。この場合、第1ボビン74a及び第2ボビン74bは、前記第1実施の形態と同様に一次側端子台78a, 78bを一方の端子台嵌合用溝30(図10右側)に嵌合させ、かつ二次側端子台82a, 82bを他方の端子台嵌合用溝30(図11左側)に嵌合させる。

【0056】さらに、第2実施の形態では、一次側端子台本体79aの一次側嵌合用副突起86a、一次側端子台本体79bの一次側嵌合用副突起86b、二次側端子台本体83aの二次側嵌合用副突起87a及び二次側端子台本体83bの二次側嵌合用副突起87bがロ字状コア73の嵌合用溝76に嵌合する。また、一次側端子台本体79aの一次側嵌合用副突起86a及び一次側端子台本体79bの一次側嵌合用副突起86bが接合されて、短辺部中央嵌合用溝77に嵌合し、同様に二次側端子台本体83aの二次側嵌合用副突起87a及び二次側端子台本体83bの二次側嵌合用副突起87bが接合されて、短辺部中央嵌合用溝77に嵌合されている。一体化された第1ボビン74a及び第2ボビン74bは、上述したように嵌合されて、かつ2本のI形状コア23a, 23b及びロ字状コア73の間に非磁性材のシート27を介在させて接着剤によりロ字状コア73に固定されている。

【0057】この第2実施の形態では、一体化された第1ボビン74a及び第2ボビン74bのロ字状コア73への固定が、前記第1実施の形態と同様に一次側端子台78a, 78bの一方の端子台嵌合用溝30(図11右側)への嵌合及び二次側端子台82a, 82bの他方の端子台嵌合用溝30(図11左側)への嵌合により行なわれるのみならず、さらに、一次側嵌合用副突起86

a、一次側嵌合用副突起86b、二次側嵌合用副突起87a及び二次側嵌合用副突起87bの嵌合用溝76への嵌合、及び接合された一次側嵌合用副突起86a, 86bの短辺部中央嵌合用溝77への嵌合及び接合された二次側嵌合用副突起87a, 87bの短辺部中央嵌合用溝77への嵌合により行なわれるので、より強固に固定することができる。また、第2実施の形態では、第1ボビン74a及び第2ボビン74bは同一形状とされており、同一のモールド型を用いて製造でき、その分製造コストを抑え装置の低廉化を図ることができる。

【0058】なお、一体化された第1ボビン74a及び第2ボビン74bのロ字状コア73への固定を接着剤で行なう場合、第2実施の形態のロ字状コア73(図11)に代えて、例えば図14に示すように構成したロ字状コア90を用いるようにしてもよい(第3実施の形態)。このロ字状コア90は、ロ字状コア73の端子台嵌合用溝30側(図11下側)の面部を廃止するように厚さを薄くして構成されており、端子台嵌合用溝30の廃止に併せて、ロ字状コア73の切欠部75(図11)も廃止され、形状が簡略化されている。

【0059】この第3実施の形態では、一体化された第1ボビン74a(図10参照)及び第2ボビン74b(図10参照)とロ字状コア90とが接合され、上述したように接着剤により固定される一方、両者の固定は、一次側嵌合用副突起86a、一次側嵌合用副突起86b、二次側嵌合用副突起87a及び二次側嵌合用副突起87b(図10～図13参照)の嵌合用溝76への嵌合、及び接合された一次側嵌合用副突起86a, 86bの短辺部中央嵌合用溝77への嵌合(図10～図13参照)及び接合された二次側嵌合用副突起87a, 87bの短辺部中央嵌合用溝77への嵌合によても行なわれる。この第3実施の形態では、ロ字状コア90が、第2実施の形態のロ字状コア73(図11)に比して、端子台嵌合用溝30(図11)及び切欠部75(図11)を廃止したものでありその形状が簡易なものになっている。そのため、ロ字状コア90を作製しやすくて生産性の向上を図ることができる。

【0060】次に、本発明の第4実施の形態に係るインバータトランジスタを図15ないし図19に基づいて説明する。なお、図1ないし図14、及び図22ないし図25と同等の部分、部材については図1ないし図14、及び図22ないし図25と同等の符号を付し、その説明は、適宜、省略する。

【0061】第4実施の形態は、前記第2実施の形態に比して、ロ字状コア73に代えて、図15～図17に示すようにロ字状コア73が有する嵌合用溝76を廃止した構造のロ字状コア91を備えたこと、第1、第2ボビン74a, 74bに代えて図15及び図16に示すように第1、第2ボビン92a, 92bを設けたこと、第1、第2ボビン92a, 92bのそれぞれは、図16、

図18及び図19に示すように、第1、第2ボビン26a, 26bの一次側嵌合用副突起86a, 86b及び二次側嵌合用副突起87a, 87bに代えて一次側嵌合用副突起(嵌合用突起)93a, 93b及び二次側嵌合用副突起(嵌合用突起)94a, 94bを設けたことが主に異なっている。

【0062】一次側嵌合用副突起93aは、図15及び図16に示すように、一次側端子台本体79aにおける一次側端子台立上り部46a側の部分の両側部〔一次側溝81aの近傍(図16下側)及び一次側突起80aの近傍(図16上側)〕に、図16紙面表側に立ち上がるよう設けられている。2つの一次側嵌合用副突起93aのうち一方のもの(図16下側)は、口字状コア91の外側になり、他方のもの(図16上側)は口字状コア91の短辺部中央嵌合用溝77に挿入され両者により口字状コア91を挟み付け得るようになっている。

【0063】一次側嵌合用副突起93bも、一次側嵌合用副突起93aと同様にして、一次側端子台本体79bにおける一次側端子台立上り部46b側の部分の両側部に設けられている。2つの一次側嵌合用副突起93bのうち一方のもの(図16上側)は、口字状コア91の外側になり、他方のもの(図16下側)は口字状コア91の短辺部中央嵌合用溝77に挿入され両者により口字状コア91を挟み付け得るようになっている。

【0064】二次側嵌合用副突起94aは、二次側端子台本体83aにおける二次側端子台立上り部51a側の部分の両側部〔二次側突起84aの近傍(図16下側)及び二次側溝85aの近傍(図16上側)〕に、図16紙面表側に立ち上がるよう設けられている。2つの二次側嵌合用副突起94aのうち一方のもの(図16下側)は、口字状コア91の外側になり、他方のもの(図16上側)は口字状コア91の短辺部中央嵌合用溝77に挿入され、両者により口字状コア91を挟み付け得るようになっている。

【0065】二次側嵌合用副突起94bも、二次側嵌合用副突起94aと同様にして、二次側端子台本体83bにおける二次側端子台立上り部51b側の部分の両側部に設けられている。2つの二次側嵌合用副突起94bのうち一方のもの(図16上側)は、口字状コア91の外側になり、他方のもの(図16下側)は口字状コア91の短辺部中央嵌合用溝77に挿入され、両者により口字状コア91を挟み付け得るようになっている。

【0066】第4実施の形態では、一体化された第1ボビン74a及び第2ボビン74bは、前記第1実施の形態と同様に一次側端子台78a, 78bを一方の端子台嵌合用溝30(図17右側)に嵌合させ、かつ二次側端子台82a, 82bを他方の端子台嵌合用溝30(図17左側)に嵌合させる。

【0067】さらに、第4実施の形態では、一次側嵌合用副突起93a, 93b及び二次側嵌合用副突起94

a, 94bが口字状コア91を挟み付けている。この口字状コア91の挟み付け及び上記一次側端子台78a, 78b及び二次側端子台82a, 82bの端子台嵌合用溝30への嵌合により、一体化された第1ボビン74a及び第2ボビン74bは口字状コア91に固定されている。この場合も、第1実施の形態に比して、一次側嵌合用副突起93a, 93b及び二次側嵌合用副突起94a, 94bが口字状コア91を挟み付ける分、一体化された第1ボビン74a及び第2ボビン74bを口字状コア91に、より強固に固定することができる。

【0068】なお、第4実施の形態の口字状コア91(図17)に代えて、例えば図20に示すように構成した口字状コア95を用いるようにしてもよい(第5実施の形態)。この口字状コア95は、口字状コア91の端子台嵌合用溝30側(図17下側)の面部を廃止するよう厚さを薄くして構成され、かつ端子台嵌合用溝30及び切欠部75(図17)も廃止され、形状が簡略化されている。

【0069】この第5実施の形態では、一体化された第1ボビン74a(図10参照)及び第2ボビン74b(図10参照)と口字状コア95とが接合され、接着剤により固定される一方、両者の固定は、一次側嵌合用副突起93a, 93b及び二次側嵌合用副突起94a, 94bが口字状コア95を挟み付ける分、一体化された第1ボビン74a及び第2ボビン74bを口字状コア95に、より強固に固定することができる。また、口字状コア95が、第4実施の形態の口字状コア91(図17)に比して、端子台嵌合用溝30(図17)及び切欠部75(図17)を廃止したものでありその形状が簡易なものになっている。そのため、口字状コア95を作製しやすくて生産性の向上を図ることができる。

【0070】次に、本発明の第6実施の形態に係るインバータトランジスタを図21に基づいて説明する。図1ないし図20、及び図22ないし図25と同等の部分、部材については図1ないし図20、及び図22ないし図25と同等の符号を付し、その説明は、適宜、省略する。なお、図21では、便宜上、一次側突起48a, 48b、一次側溝49a, 49b、二次側突起52a, 52b及び二次側溝53a, 53b等の記載は省略している。

【0071】第6実施の形態は、前記第1実施の形態に比して、I形状コア23a, 23bに代えて、I形状コア96a, 96bを備えている。I形状コア96aは、直線状に延びるI形状コア本体97aと、I形状コア本体97aと併せた形状が略L字形をなすようにI形状コア本体97aに連接されたコアL字形部(屈曲部)98aとからなっている。一方、第1ボビン26aに設けられるコア挿入孔55aは、一次側端子台本体45aの上面側部分(図21上側)で開口しているが、その開口部分99aは第1実施の形態のものが一定幅であるのに比して、端部側が拡幅されて略L字形をなしている。そし

て、開口部分99aにコアI字形部98aが嵌合されるようになっている。

【0072】I形状コア96bも、I形状コア96aと同様に、I形状コア本体97b及びコアI字形部(屈曲部)98bからなっている。また、第2ボビン26bには、第1ボビン26aの開口部分99aと同様に開口部分99bが形成されており、コアI字形部98bに嵌合するようになっている。

【0073】この第6実施の形態では、I形状コア96a、96bがコアI字形部98a、98bを備え、口字状コア21(図1参照)との磁気的結合に関して、一次側で密にし、二次側のみで口字状コア21との空隙量を調整し漏洩インダクタンスが所望の値になるようにすることができ、漏洩インダクタンスの調整の簡易化を図ることができる。

【0074】

【発明の効果】請求項1から請求項6までのいずれかに記載の発明によれば、一次側巻線が共通でありながら、それぞれ独立した複数個の二次側巻線をもつので、複数本の陰極線管(CFL)を点灯する上で、従来技術で必要とされた複数個のインバータトランジスタの設置、あるいは複数個のパラストコンデンサの設置を行なうことなく、同時に複数本の陰極線管(CFL)を点灯することができ、装置の簡素化及び低廉化を図ることができる。

【0075】また、複数個の内側コア(二次側巻線)に対応して複数個の外側コアを設ける場合に比して、複数個の内側コア(二次側巻線)に共通する1個の外側コアを設けて複数本の陰極線管(CFL)を点灯することができ、外側コアが1個で済む分、部品点数が削減されると共に、装置の小型化が図れ、ひいては装置の低廉化を図ることができる。

【0076】請求項2に記載の発明によれば、複数個のボビンを突起及び溝を嵌合させて一体化でき、確実な固定及び組付性の向上を図ることができる。請求項3に記載の発明によれば、外側コア及び複数個のボビンを、一体化される複数個のボビンの一次側端子台の一部及び二次側端子台の一部をコア側溝に嵌合させて一体化でき、確実な固定及び組付性の向上を図ることができる。請求項4に記載の発明によれば、複数個のボビンは、その一次側端子台及び二次側端子台に設けた嵌合用突起が外側コアに形成した嵌合用溝又は外側コアの外側部に嵌合して、外側コアに確実かつ強固に保持される。

【0077】請求項5に記載の発明によれば、複数本の略I形状の内側コアがその一端部に屈曲部を備え、複数本の内側コアと略口の字状の外側コアとの磁気的結合に関して、一次側で密にし、二次側のみで略口の字状の外側コアとの空隙量を調整し漏洩インダクタンスが所望の値になるようにすることが可能であり、これにより、漏洩インダクタンスの調整の簡易化を図ることができる。請求項6に記載の発明によれば、複数個のボビンは同一

形状をなすので、複数個のボビンを同一のモールド型を用いて製造でき、その分製造コストを抑え装置の低廉化を図ることができる。

【図面の簡単な説明】

【図1】本発明の第1実施の形態に係るインバータトランジスタを模式的に示す分解斜視図である。

【図2】組み付けられた状態の図1のインバータトランジスタを模式的に示す斜視図である。

【図3】図1のインバータトランジスタを示す平面図である。

【図4】図1のコ字状コアを示す斜視図である。

【図5】図3のB矢視の側面図である。

【図6】図3のA-A'線に沿う断面図である。

【図7】図1のインバータトランジスタにCFLを接続した回路図である。

【図8】図1のインバータトランジスタの等価回路を示す図である。

【図9】本発明の第2実施の形態に係るインバータトランジスタを示す斜視図である。

【図10】図9のインバータトランジスタを示す平面図である。

【図11】図9のコ字状コアを示す斜視図である。

【図12】図10のB矢視の側面図である。

【図13】図10のA-A'線に沿う断面図である。

【図14】図9のコ字状コアに代る他のコ字状コア(第3実施の形態)を示す斜視図である。

【図15】本発明の第4実施の形態に係るインバータトランジスタを示す斜視図である。

【図16】図15のインバータトランジスタを示す平面図である。

【図17】図15のコ字状コアを示す斜視図である。

【図18】図16のB矢視の側面図である。

【図19】図16のA-A'線に沿う断面図である。

【図20】図15のコ字状コアに代る他のコ字状コア(第5実施の形態)を示す斜視図である。

【図21】本発明の第6実施の形態に係るインバータトランジスタを模式的に示す分解斜視図である。

【図22】従来の開磁路構造のインバータトランジスタの一例の等価回路を示す図である。

【図23】I形状コアを用いた開磁路構造のインバータトランジスタの一例を模式的に示す平面図である。

【図24】従来の閉磁路構造のインバータトランジスタの一例を示す分解斜視図である。

【図25】閉磁路構造のインバータトランジスタにパラストコンデンサを用いる場合の回路構成を示す図である。

【符号の説明】

20 インバータトランジスタ

21 口字状コア(外側コア)

23a, 23b I形状コア(内側コア)

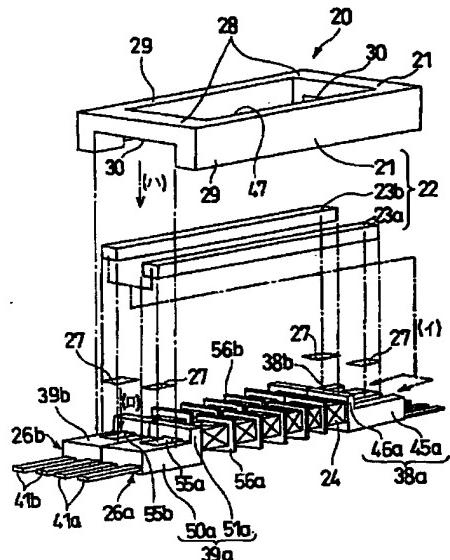
24 一次側巻線

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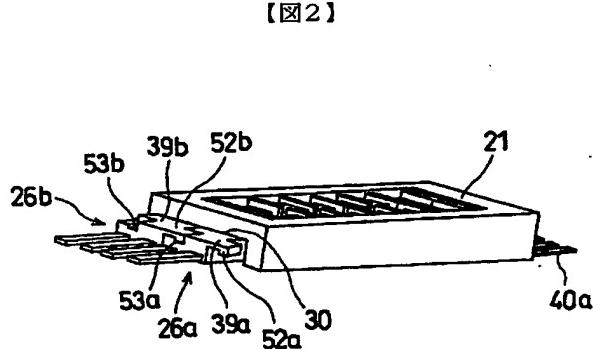
25a, 25b 二次側巻線
26a 第1ボビン
26b 第2ボビン
30 端子台嵌合用溝
38a, 38b 一次側端子台

39a, 39b 二次側端子台
48a, 48b 一次側突起
49a, 49b 一次側溝
52a, 52b 一次側突起
53a, 53b 一次側溝

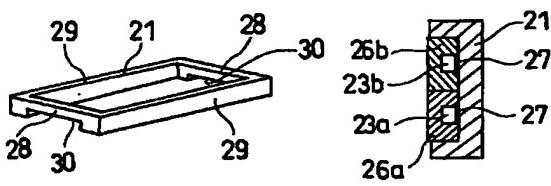
【図1】



【図3】

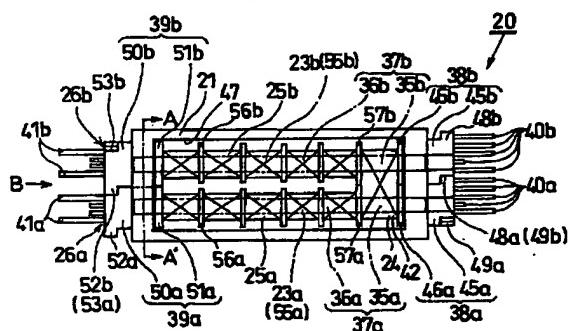


【図2】

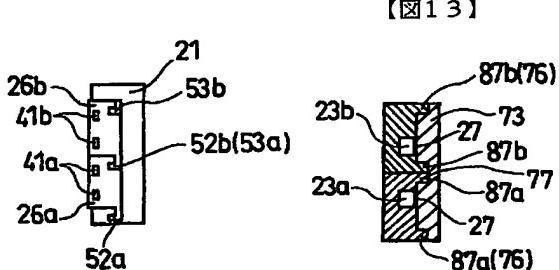


【図4】

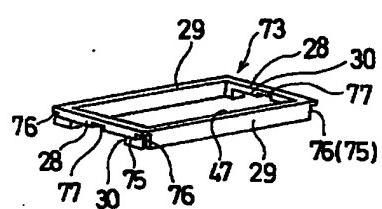
【図6】



【図5】



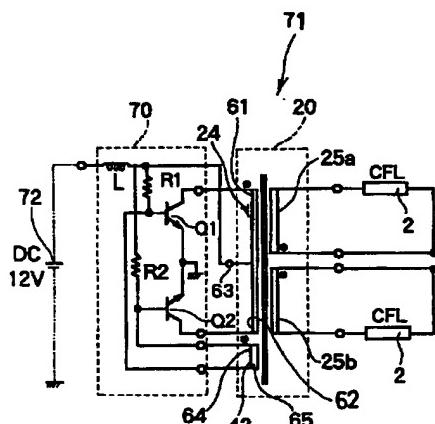
【図13】



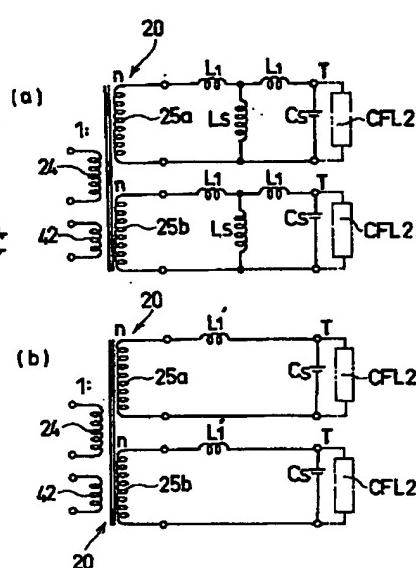
【図11】

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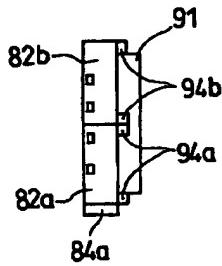
【图7】



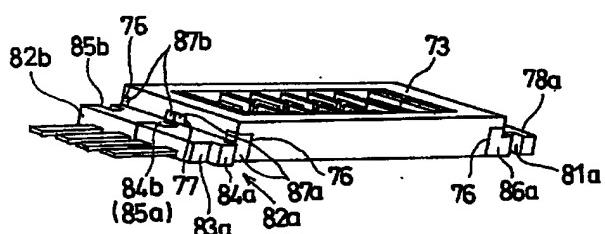
【図8】



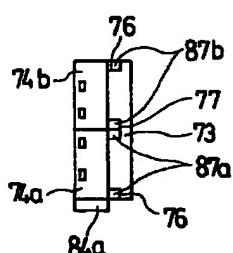
【四】



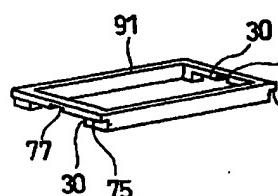
[図9]



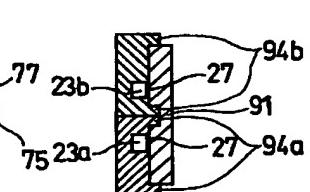
【図12】



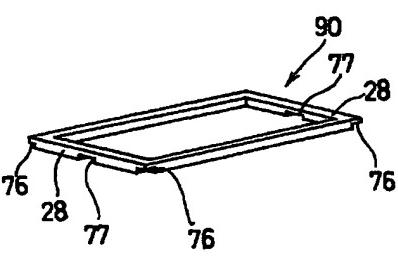
[図17]



【図19】

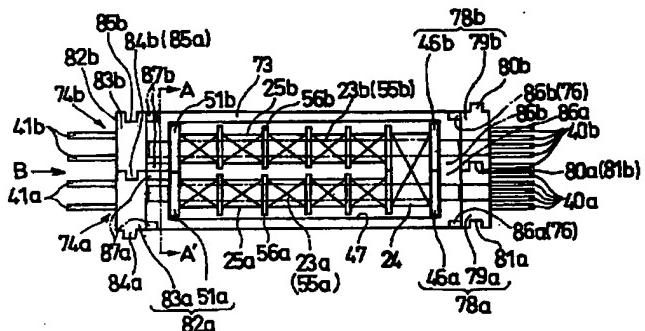


[図14]

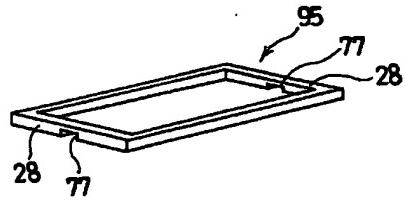


(13) 02-353044 (P2002-F序號)

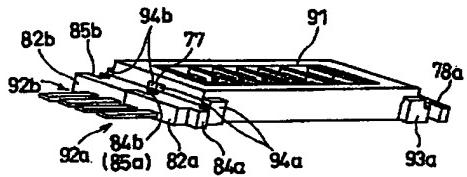
【四】



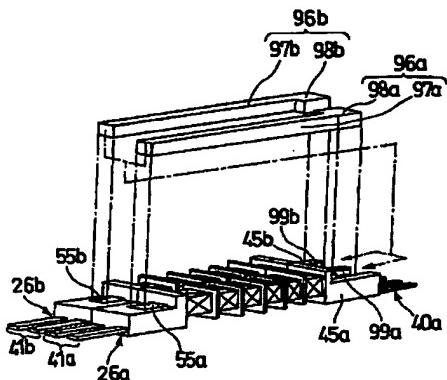
【图20】



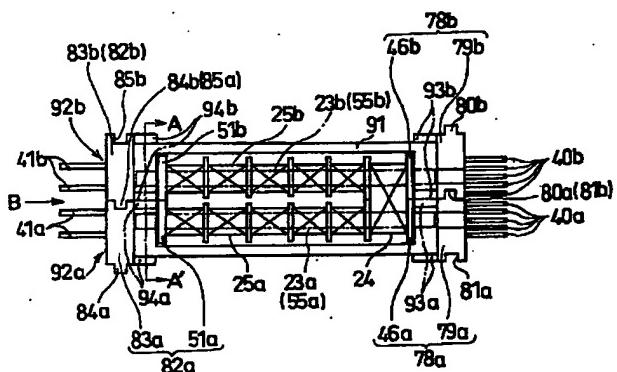
【図15】



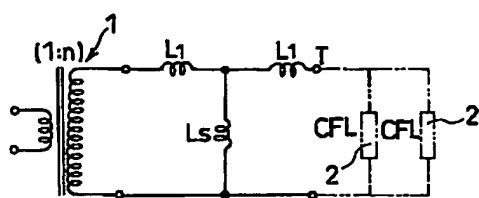
【图21】



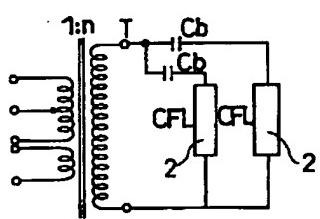
〔图16〕



〔図22〕

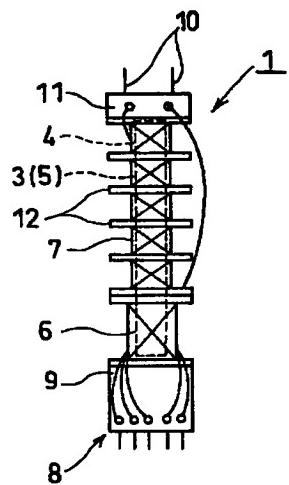


〔图25〕

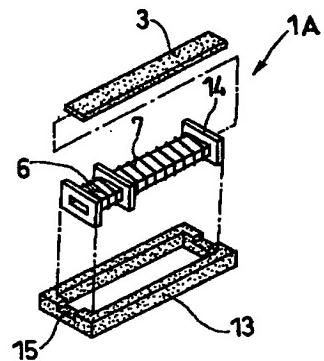


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【図23】



【図24】



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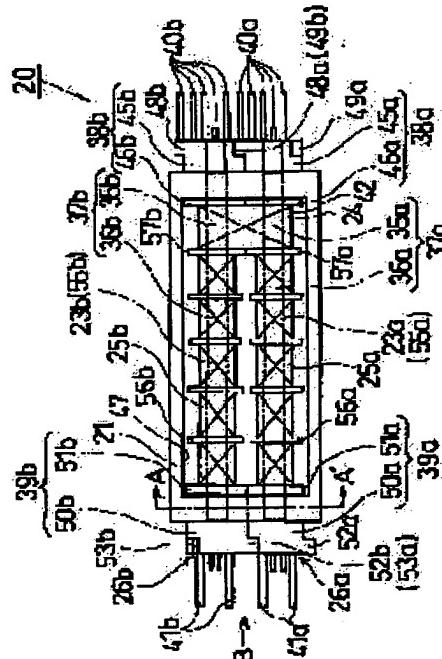
(21) Application number : 2001-157062 (71) Applicant : MINEBEA CO LTD
 (22) Date of filing : 25.05.2001 (72) Inventor : SUZUKI SHINICHI

(54) INVERTER TRANSFORMER

(57) Abstract:

PROBLEM TO BE SOLVED: To provide a small and inexpensive inverter transformer in which a plurality of CFLs can be lighted while minimizing increase in the number of components.

SOLUTION: First and second bobbins 26a and 26b are integrated while being applied with secondary windings 25a and 25b, respectively, I-shaped cores 23a and 23b are inserted into core insertion holes 55a and 55b, respectively, and a primary winding 24 is wound commonly around the integrated first and second bobbins 26a and 26b. A square core 21 is interposed between the I-shaped cores 23a, 23b and a sheet 27 of nonmagnetic material and coupled magnetically to have a specified leakage inductance. Since two CFLs can be driven using a single square core 26, the number of components can be decreased as compared with a case using two square cores in correspondence with the I-shaped cores 23a and 23b. Consequently, the size of the inverter transformer can be reduced resulting in an inexpensive inverter transformer.



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decision of rejection]
[Date of requesting appeal against
examiner's decision of rejection]
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CLAIMS

[Claim(s)]

[Claim 1] It is the inverter transformer which the inverter circuit which changes a direct current into an alternating current is equipped with, carries out the pressure up of the alternating voltage inputted into the upstream, and is outputted to secondary. The outside core of the shape of a character of abbreviation RO, Two or more inside cores of the abbreviation I configuration joined so that it may arrange inside this outside core and may have a predetermined leakage inductance in said outside core, The upstream coil formed in common with two or more secondary coil and these two or more secondary coils which are formed corresponding to these two or more inside cores, Make abbreviation tubed, more than one are prepared corresponding to said two or more secondary coils, and said two or more inside cores are inserted inside, respectively. It has outside two or more bobbins which wind said two or more secondary coils, respectively. The end side of each of said bobbins of two or more is equipped with the secondary terminal block for said secondary coils for the upstream terminal block for said upstream coils again at an other end side. Said two or more bobbins The inverter transformer characterized by winding said upstream coil around said two or more bobbins which are combined, and are unified and unified where a secondary coil is wound, respectively.

[Claim 2] It is the inverter transformer characterized by forming a projection and the slot of each other in the bond part of said each second side terminal block possible [fitting] while it is unified when each upstream terminal block combines said two or more bobbins in a configuration according to claim 1 and each secondary terminal block joins together, and a projection and the slot of each other are formed in the bond part of each of said upstream terminal block possible [fitting].

[Claim 3] The inverter transformer characterized by establishing the core gutter which fits in, respectively in a part of upstream terminal block of two or more of said bobbins unified, and a part of secondary terminal block in said outside core in a configuration according to claim 1 or 2.

[Claim 4] The inverter transformer characterized by preparing the projection for fitting which fits into the lateral part of the slot for fitting formed in two or more of said upstream terminal blocks and secondary terminal blocks of a bobbin which are unified to said outside core, or said outside core in a configuration given in either from claim 1 to claim 3.

[Claim 5] The inverter transformer characterized by having the flection which makes the abbreviation mold for L characters at the end section of an inside core in a configuration given in either from claim 1 to claim 4.

[Claim 6] It is the inverter transformer characterized by said two or more bobbins making the same configuration in a configuration given in either from claim 1 to claim 5.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the inverter transformer for pressure ups used for the output stage of the inverter circuit which turns on the light source for screen lighting of a liquid crystal display.

[0002]

[Description of the Prior Art] In recent years, instead of a cathode-ray tube and the so-called CRT, a liquid crystal display (it is hereafter called LCD for short.) has come to be widely used as display units, such as a personal computer. Since this LCD does not have a luminescence function unlike CRT, the light source for the screen lighting of a back light method or a front light method is needed. Moreover, in order to maintain the screen of such LCD at high brightness, two or more cold cathode-ray tube lamps (henceforth CFL) are used, it may discharge to coincidence and it may be made to turn them CFL on as the above-mentioned light source.

[0003] Generally, about [12V] direct-current input voltage is inputted into the upstream of a transformer (inverter transformer) as alternating voltage through a ROIYA (ROYER) oscillator circuit, and the inverter circuit which makes secondary [that] generate 60kHz and about [1600V] high-frequency voltage at the time of discharge starting is used for discharge of this kind of CFL, and lighting.

[0004] This inverter circuit is controlled after discharge of CFL to lower the secondary electrical potential difference of an inverter transformer to an about [600V] electrical potential difference required to maintain discharge of CFL. Pulse width (it is called PWM PULSE WIDTH MODULATION and the following.) control is usually used for this armature-voltage control.

[0005] As an inverter transformer used for such an inverter circuit, there are a thing of open magnetic circuit structure which used I configuration core for the core from the former, and a thing which made the core closed magnetic circuit structure. The equal circuit of the inverter transformer of open magnetic circuit structure is shown in drawing 22. In this drawing, a leakage inductance and Ls of the ideal pressure-up transformer (inverter transformer) which is 1:n in which 1 does not have loss, and L1 are the inductances of a secondary coil. By this ideal pressure-up transformer (inverter transformer of open magnetic circuit structure) 1, when CFL2 connected is one, the leakage inductance L1 plays the role of a ballast inductance, and performs normal discharge.

[0006] However, if CFL2 is connected to 2 juxtaposition at the inverter transformer output terminal T and one of CFL2 will discharge previously, the electrical potential difference of the inverter transformer output terminal T will descend with the leakage inductance L1, and CFL2 of another side will become discharge impossible. The example of the inverter transformer 1 of the open magnetic circuit structure which used I configuration core 3 for drawing 23 in the core is shown. As a dotted line shows, I configuration core 3 is inserted in the hole section 5 formed in the bobbin 4 tubed by drawing 23 by extending in shaft orientations.

[0007] The upstream coil 6 and the secondary coil 7 are wound around the bobbin 4, and the terminal block 9 in which the terminal pin 8 of the upstream coil 6 was carried, and the terminal block 11 in which the terminal pin 10 of the secondary coil 7 was carried are formed. Moreover, since the electrical potential difference by which induction is carried out to secondary is high pressure, the dashboard 12 of a bobbin 4 divided the secondary coil 7, it was wound, and has

prevented creeping discharge. The inverter transformer 1 of the open magnetic circuit structure which used I configuration core 3 for the above-mentioned core Although structure is easy compared with inverter transformer 1A of the closed magnetic circuit structure which constitutes a core combining abbreviation RO typeface-like a core 13 and I configuration core 3, and is constituted by winding a coil around the bobbin 14 which inserts I configuration core 3 as shown in drawing 24. Since the leakage inductance is large, when two or more CFL(s) are connected, one may light up and the phenomenon which is that others cannot be turned on may happen.

[0008] Inverter transformer 1A of the closed magnetic circuit structure shown in drawing 24 is the structure to which I configuration core 3 was inserted in the hole section (sign abbreviation) of the tubed bobbin 14, the upstream coil 6 and the secondary coil 7 were fitted into the bobbin 14, and it fitted winding and I configuration core 3 into the fitting slot 15 of the RO typeface-like core 13. In addition, although there is also an inverter transformer which considers as the open magnetic circuit structure which prepared the opening among both using RO typeface-like the core 13 and I configuration core 3 which were used since the core of closed magnetic circuit structure was constituted from inverter transformer 1A shown in drawing 24 $R > 4$, and adjusts a leakage inductance When two or more CFL(s) are connected to juxtaposition, about all the two or more CFL(s), it may happen that the light cannot be switched on the same with having mentioned above. Therefore, in case two or more CFL(s) are made to turn on, in using the inverter transformer of open magnetic circuit structure, one inverter transformer is needed to one CFL.

[0009] When using much CFL(s) as in the screen lighting in LCD corresponding to high brightness, two or more inverter transformers are needed, and while the whole inverter transformer is enlarged, cost will also go up.

[0010] Moreover, although structure was easy, since especially the leakage inductance was large, phase contrast arose on the electrical potential difference and the current, the so-called reactive power increased and the inverter transformer of the open magnetic circuit structure which used I configuration core for the core also had the problem of reducing power efficiency remarkably. On the other hand, as for the inverter transformer which made the core closed magnetic circuit structure, it is possible to connect two or more CFL(s), to discharge and to make all of them CFL turn on.

[0011] However, with closed magnetic circuit structure, if which CFL discharges in this case, the discharge current flows by the fall of that internal impedance of CFL and the load current increases, although a leakage inductance is small, the output terminal electrical potential difference of an inverter transformer will fall. For this reason, the discharge conditions of other CFL(s) are affected and each discharge actuation of CFL may be made to produce dispersion. Moreover, since the impedance of CFL has negative resistance characteristics, when one CFL discharges and lights up, the impedance of CFL decreases rapidly, a current increases rapidly, and damage on inverter transformers, such as an open circuit of a coil, may be produced.

[0012] For this reason, since the leakage inductance is small to the inverter transformer of closed magnetic circuit structure, as shown in drawing 25, the output terminal T and the approach of inserting the ballast capacitor Cb between [of CFL2] each are used. However, by this approach, while phase contrast arises on an electrical potential difference and a current by the inserted ballast capacitor Cb and reducing power efficiency remarkably by the so-called increment in reactive power, there were problems, such as a cost rise by the increment in components mark and the expensive ballast capacitor Cb of high pressure-proofing.

[0013] [Problem(s) to be Solved by the Invention] By the conventional inverter transformer, as mentioned above, if it was in the thing of open magnetic circuit structure, when the number of an inverter transformer increased due to the number of CFL, and 1 to 1, it enlarged as the whole inverter transformer, and there was a trouble of causing the rise of cost. Moreover, although two or more CFL(s) might be made to discharge by one inverter transformer if it was in the thing of closed magnetic circuit structure, discharge actuation was made to produce dispersion between CFL(s), and there was a problem of damaging an inverter transformer according to an overcurrent. Although the solution of inserting a ballast capacitor in a serial was in each CFL, there was a problem of causing the decline in power efficiency and the increase of components mark or cost by this in dispersion in the discharge actuation between CFL(s).

[0014] This invention was made in view of the above-mentioned situation, and aims at offering the inverter [which suppresses the increment in the number of components to necessary minimum, and can perform lighting of two or more cold cathode-ray tube lamps (CFL)] transformer which is small and can attain cheap-ization.

[0015]

[Means for Solving the Problem] It is the inverter transformer which the inverter circuit which changes a direct current into an alternating current is equipped with invention according to claim 1, carries out the pressure up of the alternating voltage inputted into the upstream, and is outputted to secondary. The outside core of the shape of a character of abbreviation RO, Two or more inside cores of the abbreviation I configuration joined so that it may arrange inside this outside core and may have a predetermined leakage inductance in said outside core, The upstream coil formed in common with two or more secondary coil and these two or more secondary coils which are formed corresponding to these two or more inside cores, Make abbreviation tubed, more than one are prepared corresponding to said two or more secondary coils, and said two or more inside cores are inserted inside, respectively. It has outside two or more bobbins which wind said two or more secondary coils, respectively. The end side of each of said bobbins of two or more is equipped with the secondary terminal block for said secondary coils for the upstream terminal block for said upstream coils again at an other end side. Said two or more bobbins It is characterized by winding said upstream coil around said two or more bobbins which are combined, and are unified and unified where a secondary coil is wound, respectively.

[0016] In a configuration according to claim 1, invention according to claim 2 is characterized by forming a projection and the slot of each other in the bond part of said each second side terminal block possible [fitting] while it is unified when each upstream terminal block combines said two or more bobbins and each secondary terminal block joins together, and a projection and the slot of each other are formed in the bond part of each of said upstream terminal block possible [fitting]. Invention according to claim 3 is characterized by establishing the core gutter which fits in, respectively in a part of upstream terminal block of two or more of said bobbins unified, and a part of secondary terminal block in said outside core in a configuration according to claim 1 or 2. Invention according to claim 4 is characterized by preparing the projection for fitting which fits into the lateral part of the slot for fitting formed to said outside core, or said outside core in two or more of said upstream terminal blocks and secondary terminal blocks of a bobbin which are unified in a configuration given in either from claim 1 to claim 3.

[0017] Invention according to claim 5 is characterized by equipping the end section of an inside core with the flection which makes the abbreviation mold for L characters in a configuration given in either from claim 1 to claim 4. As for said two or more bobbins, invention according to claim 6 is characterized by making the same configuration in a configuration given in either from claim 1 to claim 5.

[0018]

[Embodiment of the Invention] The inverter transformer concerning the gestalt of the 1st operation of this invention is explained based on drawing 1 thru/or drawing 8. In addition, a sign equivalent to drawing 22 thru/or drawing 25 about drawing 22 thru/or a part equivalent to drawing 25, and a member is attached, and the explanation is omitted suitably. Drawing 1 is the decomposition perspective view having shown the inverter transformer typically, in order to understand like the erector of the inverter transformer concerning the gestalt of the 1st operation of this invention.

[0019] As shown in drawing 1 - drawing 3, the inverter transformer 20 Abbreviation RO typeface-like core (it is hereafter called a RO character-like core.) Two I configuration cores 23a and 23b which constitute a core 22 with 21 and this RO character-like core 21, The secondary coils 25a and 25b of one upstream coils [24 or 2], and the coil 42 (drawing 7) for feedback mentioned later, The profile configuration is carried out from two rectangle tubed bobbins 26a and 26b which are prepared corresponding to two secondary coils and wind the upstream coil 24, the coil 42 for feedback, and two secondary coils 25a and 25b. The RO character-like core 21 is laid and the inverter transformer 20 is assembled by the bobbins 26a and 26b unified so that it may mention later, as the drawing 1 (**) shows, I configuration cores 23a and 23b are inserted, respectively, (**) shows, the sheet 27 of nonmagnetic material later mentioned on I configuration cores 23a and 23b is

laid and (Ha) shows on this further. In addition, in drawing 1, the publication of the upstream projections 48a and 48b and the primary gutters 49a and 49b which are shown by drawing 3, the secondary projections 52a and 52b, the secondary slots 53a and 53b, etc. is omitted for convenience. [0020] Two bobbins 26a and 26b are constituted by the same configuration. The thing of the drawing 3 bottom is called 1st bobbin 26a between two bobbins 26a and 26b, and the thing of the drawing 3 top is called 2nd bobbin 26b. Moreover, 23a shows for convenience what is prepared in 1st bobbin 26a between two I configuration cores 23a and 23b, and 23b shows what is prepared in 2nd bobbin 26b. The RO character-like core 21 constitutes an outside core, and I configuration cores 23a and 23b constitute the inside core from a gestalt of this operation. It is combined and the 1st and 2nd bobbin 26a and 26b is unified so that it may mention later. Two secondary coils 25a and 25b are wound around the 1st and 2nd bobbin 26a and 26b, respectively, and the upstream coil 24 is wound around the 1st and 2nd unified bobbin 26a and 26b in common.

[0021] It is joined to the RO character-like core 21 through the sheet 27 of nonmagnetic material, and is made for two I configuration cores 23a and 23b to have the predetermined leakage inductance held so that it may mention later. The RO character-like core 21 consists of a short side part 28 of the shape of the two square pole, and a long side 29 of the shape of the two square pole, as shown in drawing 1 and drawing 4. The slot (henceforth the fitting slot for terminal blocks) 30 where fitting of the terminal block (the upstream terminal blocks 38a and 38b and secondary terminal blocks 39a and 39b) later mentioned as shown in drawing 1, drawing 2, and drawing 4 is carried out is formed in the whole surface side of both the short side parts 28 of the RO character-like core 21.

[0022] Next, the configuration of the 1st and 2nd bobbin 26a and 26b is explained. In addition, as mentioned above, the 1st and 2nd bobbin 26a and 26b is constituted by the same configuration, hereafter, about 1st bobbin 26a, explains the structure and explains [b / 2nd bobbin 26] it additionally as contrasted with 1st bobbin 26a. In addition, it abbreviates to mentioning explanation of each component of 2nd bobbin 26b later suitably.

[0023] 1st bobbin 26a is equipped with upstream terminal-block 38a and secondary terminal-block 39a which are prepared in an end [of drum section 37a of the shape of straight side which consists of secondary coil section 36a around which upstream coil section 35a and secondary coil 25a around which the upstream coil 24 is wound are wound, and drum section 37a], and other end side, respectively as shown in drawing 3. Five upstream coil terminal pin 40a is prepared in the whole surface section (drawing 3 right-hand side) of upstream terminal-block 38a. As five upstream coil terminal pin 40a is shown in drawing 7, three are carried out among those to push pull connection (namely, the start edge 61, the termination 62, and for center taps 63) of the upstream of the inverter transformer 20, and two are used as the coils 42 for feedback (namely, the start edge 64 and for termination 65). [of the upstream coil 24] [of the coil 42 for feedback] The coil 42 for feedback is arranged in the upstream coil 24 and an abbreviation equivalent location (refer to drawing 1 and drawing 3), and the both ends are connected to any two pins of the upstream coil terminal pins 40a and 40b. In addition, the illustration to drawing 1 and drawing 3 R>3 grade is omitted about the coil 42 for feedback. Moreover, two secondary coil terminal pin 41a is prepared in the whole surface section (drawing 3 left-hand side) of secondary terminal-block 39a.

[0024] As shown in drawing 1 and drawing 3, the profile configuration of the upstream terminal-block 38a is carried out from standup section (henceforth the upstream terminal-block standup section) 46a formed in a connection [a / rectangular primary side edge child script object 45a in which upstream coil terminal pin 40a is prepared, and / drum section 37 of this primary side edge child script object 45a] side. Upstream terminal-block 38a is making side view and an abbreviation L typeface. Moreover, as for upstream terminal-block 38a, let the width method (drawing 3 vertical lay length) be the die length of the abbreviation one half of the width method (drawing 3 vertical lay length) of the hole 47 of the rectangle of the RO character-like core 21.

[0025] the surface part by the side of upstream terminal-block standup section 46a in primary side edge child script object 45a (drawing 3 space side front) -- and the inside of the near both ends in which upstream coil terminal pin 40a is prepared -- on the other hand (on drawing 3) -- *** -- The projection of a side view abbreviation L typeface (it is hereafter called an upstream projection.) The slot on the configuration which 48a is formed and meets another side (under [R> drawing 3 3]) at upstream projection 48a (it is hereafter called a primary gutter.) 49a is formed.

[0026] As shown in drawing 1 and drawing 3, the profile configuration of the secondary terminal-block 39a is carried out from standup section (henceforth the secondary terminal-block standup section) 51a formed in a connection [a / of the body of a bobbin / rectangular secondary terminal script object 50a in which secondary coil terminal pin 41a is prepared, and / drum section 37] side. Secondary terminal-block 39a is making side view and an abbreviation L typeface. Moreover, as for upstream terminal-block 38a, let the width method (drawing 3 vertical lay length) be the die length of the abbreviation one half of the width method (drawing 3 vertical lay length) of the hole 47 of the rectangle of the RO character-like core 21.

[0027] the surface part by the side of secondary terminal-block standup section 51a in secondary terminal script object 50a (drawing 3 space side front) -- and the inside of the near both ends in which secondary coil terminal pin 41a is prepared -- on the other hand (under drawing 3) -- *****, as shown in drawing 2, drawing 3, and drawing 5. The projection of a side view abbreviation L typeface (it is hereafter called a secondary projection.) The slot on the configuration which 52a is formed and meets another side (on drawing 3) at secondary projection 52a (it is hereafter called a secondary slot.) 53a is formed.

[0028] 1st bobbin 26a is united with 2nd bobbin 26b. The part from upstream terminal-block standup section 46a to secondary terminal-block standup section 51a It is arranged in the hole 47 of the RO character-like core 21, and fitting of the part by the side of upstream terminal-block standup section 46a in primary side edge child script object 45a and the part by the side of secondary terminal-block standup section 51a in secondary terminal script object 50a is carried out to the fitting slot 30 for terminal blocks of the RO character-like core 21.

[0029] Hole (henceforth core insertion hole) 55a prolonged to the part in the middle of primary side edge child script object 45a to secondary terminal script object 50a is formed in 1st bobbin 26a, and he is trying to insert I configuration core 23a. Opening of the part for the top-face flank of primary side edge child script object 45a of core insertion hole 55a (drawing 3 space side front) is carried out, and it is carrying out opening of the part for the top-face flank by the side of secondary terminal-block standup section 51a in secondary terminal script object 50a (drawing 3 space side front).

[0030] Although it unites with 2nd bobbin 26b and fitting of upstream terminal-block 38a and the secondary terminal-block 39a is carried out to the fitting slot 30 for terminal blocks of the RO character-like core 21 as mentioned above, 1st bobbin 26a Between the short side part 28 of the RO character-like core 21, and I configuration core 23a inserted in core insertion hole 55a, as shown in drawing 1 and drawing 6, the sheet 27 of said nonmagnetic material intervenes.

[0031] Although secondary coil 25a is wound in accordance with the shaft orientations of 1st bobbin 26a (I configuration core 23a), since the high voltage is generated, it is divided into a section [two or more (the gestalt of this operation five)] by the shaft orientations, insulating dashboard 56a is prepared between each section, and the creeping distance required for inhibition of creeping discharge is held. Notching which is not illustrated is formed in dashboard 56a, and secondary coil 25a of both the sections that carried out dashboard 56a in between is connected through this notching.

[0032] The pore (illustration abbreviation) or slot (illustration abbreviation) for lead wire (illustration abbreviation) which connects with upstream coil terminal pin 40a from the upstream coil 24 is established in upstream terminal-block 38a. A pore lets said lead wire pass in the condition of having been covered with the insulating material, or it is embedded in a slot, and he is trying to maintain the sufficient creeping distance and sufficient insulation. Moreover, the pore (illustration abbreviation) or slot (illustration abbreviation) for lead wire (illustration abbreviation) linked to secondary coil terminal pin 41a from secondary coil 25a is established in secondary terminal-block 39a. A pore lets said lead wire pass in the condition of having been covered with the insulating material, or it is embedded in a slot, and he is trying to maintain the sufficient creeping distance and sufficient insulation. In addition, the coil of the earth side of the secondary coil 25 penetrates the lower part of the upstream coil 24, and connects it to upstream coil terminal pin 40a. In this case, it is not necessary to prepare the pore or slot for lead wire mentioned above to 1st bobbin 26a, and 1st bobbin 26a can be produced easily.

[0033] Between upstream coil section 35 of 1st bobbin 26a a, and secondary coil section 36a, dashboard (henceforth upstream coil section side dashboard) 57a is prepared. The die length of the

direction (the drawing 3 vertical direction) which intersects perpendicularly with 1st bobbin 26a is set up for a long time as compared with dashboard 56a, and when 1st bobbin 26a is united with 2nd bobbin 26b, upstream coil section side dashboard 57a touches upstream coil section side dashboard 57 of 2nd bobbin 26b b, as shown in drawing 3. In addition, about dashboard 56 of 1st bobbin 26a a, as shown in drawing 3, when 1st bobbin 26a is united with 2nd bobbin 26b, it considers as the dimension which forms a clearance between dashboard 56 of 2nd bobbin 26b b.

[0034] 2nd bobbin 26b is constituted by the same configuration as 1st bobbin 26a as mentioned above. For this reason, about 2nd bobbin 26b, it considers as the thing using what replaced with "b" "a" in the sign which shows 1st bobbin 26a and an equivalent element as a sign (for example, 35b shows the upstream coil section of 2nd bobbin 26b corresponding to upstream coil section 35 of 1st bobbin 26a a.), and explanation of each element is omitted.

[0035] 1st bobbin 26a and 2nd bobbin 26b are combined and unified where the secondary coils 25a and 25b are wound, respectively. In this case, when primary gutter 49 of 2nd bobbin 26b b and secondary projection 52b fit in, 1st bobbin 26a and 2nd bobbin 26b are combined and united with upstream projection 48 of 1st bobbin 26a a, and secondary slot 53a, respectively. And the upstream coil 24 is wound around upstream coil section 35 of upstream coil section 35a and 2nd bobbin 26b of 1st bobbin 26a unified in this way b in common. Under the present circumstances, I configuration core 23b inserted in core insertion hole 55 of I configuration core 23a [which is inserted in core insertion hole 55 of 1st bobbin 26a a] and 2nd bobbin 26b b is being positioned and fixed to the RO character-like core 21 by the part equivalent in electromagnetism through the sheet 27 of said nonmagnetic material so that it may have an equal property in the upstream coil 24 and mutual and may combine with them in electromagnetism.

[0036] Said 1st bobbin 26a and 2nd bobbin 26b which were unified are in the condition equipped with the upstream coil 24 mentioned above, the coil 42 for feedback, the secondary coils 25a and 25b, and I configuration cores 23a and 23b, and are being fixed to the RO character-like core 21. In this case, 1st bobbin 26a and 2nd bobbin 26b make one slot 30 (drawing 1 right-hand side) for terminal-block fitting carry out fitting of the upstream terminal blocks 38a and 38b, and make the slot 30 (drawing 1 left-hand side) for terminal-block fitting on another side carry out fitting of the secondary terminal blocks 39a and 39b, and are being fixed to the RO character-like core 21 by adhesives. Moreover, with the gestalt of the 1st operation, 1st bobbin 26a and 2nd bobbin 26b are made into the same configuration, can be manufactured using the same mold mold, can hold down the part manufacturing cost, and can attain cheap-ization of equipment. In addition, it is not necessary to make it the same configuration about 1st bobbin 26a and 2nd bobbin 26b.

[0037] By the inverter transformer 20 constituted as mentioned above, while electromagnetic-like association is realized, as for each of the secondary coils 25a and 25b, and the upstream coil 24, the secondary coils 25a and 25b are respectively equivalent in electromagnetism. Moreover, as mentioned above, two I configuration cores 23a and 23b and the RO character-like core 21 are making the sheet 27 of nonmagnetic material intervene among both, and they are magnetically combined so that the inverter transformer 20 may have a predetermined leakage inductance between the upstream and secondary.

[0038] By the inverter transformer 20 constituted as mentioned above, the magnetic flux phi1 and phi2 (illustration abbreviation) generated according to the current passed to the upstream coil 24 flows to the RO character-like core 21, without each magnetic flux interfering mutually in order to flow I configuration cores 23a and 23b in the same direction. For this reason, though the upstream coil 24 is common, since it has the secondary coils 25a and 25b which became independent, respectively, two CFL(s)2 can be driven to coincidence.

[0039] Moreover, although it is possible to constitute so that two RO character-like cores may be prepared corresponding to I configuration cores 23a and 23b (secondary coils 25a and 25b) when driving two CFL(s) Thus, since it has joined together magnetically so that one RO character-like core 26 common to I configuration cores 23a and 23b (secondary coils 25a and 25b) may be formed and two CFL(s)2 may be driven as compared with the case where it constitutes While the part and components mark to which a RO character-like core can be managed with one are reduced, the miniaturization of equipment can be attained, as a result cheap-ization of equipment can be attained.

[0040] The circuit which connected two CFL(s)2 to the inverter transformer 20 mentioned above is

shown in drawing 7. In the circuit of drawing 7, the inverter circuit 71 consists of an inverter transformer 20 and a ROYER (ROYER) oscillator circuit 70. In drawing 7, the ROYER oscillator circuit 70 to which the electrical potential difference was supplied from DC power supply 72 generates high-frequency voltage. The inverter transformer 20 inputs this high-frequency voltage into the upstream coil 24 of a push pull format, and carries out a pressure up with the secondary coils 25a and 25b. And the inverter transformer 20 impresses this electrical potential difference by which the pressure up was carried out to two CFL(s)2 connected to the secondary coils 25a and 25b, discharges and makes two CFL(s)2 turn on.

[0041] The equal circuit of drawing 8 (b) which simplified the equal circuit of drawing 8 (a) or the equal circuit of drawing 8 (a) can show the inverter transformer 20 of drawing 7. Cs is the parasitic capacitance of LCD (liquid crystal unit) among drawing 8. In addition, since the Maine inductance Ls of the inverter transformer 20 serves as a large impedance on the frequency which generally turns on CFL in the equal circuit of drawing 8 (a), even if it permutes the equal circuit of drawing 8 (a) by the equal circuit of drawing 8 (b), an error is small, and it is satisfactory, even if it uses the equal circuit of drawing 8 (b) when investigating the property of the inverter transformer 20 of drawing 7.

[0042] As shown in drawing 8, although the secondary coils 25a and 25b make the upstream coil 24 common, they become independent mutually, and are equivalent to mutual in electromagnetism. That is, as shown in drawing 8 (b), respectively, each CFL2 is a circuit which is equivalent to the Maine inductance Ls by predetermined circuit [drawing 8 (a) through separate leakage inductance Ll' and Ll' (it is here and is Ll'=Ll+Ll.), and is not illustrated by simplified drawing 8 (b).] Although it connects, the predetermined circuit is the circuit of equivalence mutually.

[0043] As mentioned above, even if either lights up previously between two CFL(s)2, since the output voltage (electrical potential difference of an output T) of the coil corresponding to CFL2 of another side does not descend, it does not affect the discharge conditions of CFL2 of another side among the secondary coils 25a and 25b. That is, after making one CFL2 discharge and switching on the light, without using an expensive ballast capacitor (for example, ballast capacitor Cb of drawing 25) with high pressure-proofing, it discharges and CFL2 of another side may be made to turn on normally.

[0044] With the conventional technique, although two or more inverter transformers needed to be formed or the ballast capacitor needed to be formed corresponding to two or more CFL(s) corresponding to two or more CFL(s) for the drive of two or more CFL(s), according to the gestalt of **** 1 operation, the drive of two CFL(s)2 can be achieved by one inverter transformer 20, without forming a ballast capacitor. For this reason, the simplification and cheap-izing of equipment can be attained. In addition, the drive of two CFL(s)2 being achieved by one inverter transformer 20 in this way, without forming a ballast capacitor, and the simplification and cheap-izing of equipment being attained is being able to say also like the gestalt of the 2nd - the 6th operation mentioned later.

[0045] CFL -- two -- switching on the light -- a case -- the -- a frequency -- drawing 8 -- (-- b --) -- an equal circuit -- being shown -- an inverter -- a transformer -- 20 -- leakage -- an inductance -- Ll -- ' -- parasitic capacitance -- Cs -- forming -- resonance frequency -- ***** -- CFL2 -- driving -- if -- CFL2 -- usually -- 1000 -- the light is switched on on an about [600V] electrical potential difference as secondary output voltage required [V or more]. And since a leakage inductance changes when the secondary coils 25a and 25b have rare short-circuit, it becomes impossible to supply power to CFL2, output voltage descends, and emitting smoke and ignition do not arise.

[0046] Although the case where two pieces were prepared was made into the example with the gestalt of **** 1 operation like I configuration cores 23a and 23b (secondary coils 25a and 25b) as an I configuration core (secondary coil) so that two CFL(s)2 might be driven It may replace with this, and you may constitute so that three or more CFL(s)2 may be driven, and three or more I configuration cores (secondary coil) may be prepared. In addition, this is being able to say also like the gestalt of the 2nd - the 6th operation mentioned later.

[0047] Next, the inverter transformer concerning the gestalt of the 2nd operation of this invention is explained based on drawing 9 thru/or drawing 13. In addition, a sign equivalent to drawing 1 thru/or drawing 8 and drawing 22 R> 2 thru/or drawing 25 about drawing 1 thru/or drawing 8 and drawing 22 thru/or a part equivalent to drawing 25, and a member is attached, and the explanation is omitted suitably. As compared with the gestalt of said 1st operation, the gestalt of the 2nd operation was

replaced with the 1st and 2nd bobbin 26a and 26b, and is equipped with the 1st and 2nd bobbin 74a and 74b. The RO character-like core 73 corresponding to the RO character-like core 21 of the gestalt of the 1st operation forms in the lower part side of a short side part 28 the notch 75 prolonged in the longitudinal direction, as shown in drawing 11. Furthermore, as shown in drawing 9 R>9 - drawing 13, the slot 76 for fitting is formed in the four corners of the RO character-like core 73. Moreover, as shown in drawing 11 - drawing 13, the slot (henceforth the slot for short side part central fitting) 77 is formed in the lower part side of the center section of the short side part 28.

[0048] The 1st and 2nd bobbin 74a and 74b is equipped with the upstream terminal blocks 78a and 78b, respectively, as shown in drawing 1010. The upstream terminal blocks 78a and 78b consist of the upstream terminal-block standup sections 46a and 46b it connects [upstream / this / the primary side edge child script objects 79a and 79b and], respectively. As for the upstream terminal-block standup sections 46a and 46b, let the width method (drawing 10 vertical lay length) be the die length of the abbreviation one half of the width method (drawing 10 vertical lay length) of the hole 47 of the rectangle of the RO character-like core 73.

[0049] Rectangular projection (henceforth upstream projection) 80a is formed in the whole surface section (on drawing 10) in primary side edge child script object 79a, and, on the other hand, slot (henceforth primary gutter) 81a of a configuration which meets upstream projection 80a as shown also in drawing 9 is formed in the section (under drawing 10) at it. Corresponding to upstream projection 80a and primary gutter 81a, upstream projection 80b and primary gutter 81b are prepared in primary side edge child script object 79b.

[0050] Furthermore, the 1st and 2nd bobbin 74a and 74b is equipped with the secondary terminal blocks 82a and 82b, respectively. The secondary terminal blocks 82a and 82b consist of the secondary terminal-block standup sections 51a and 51b it connects [secondary / this / the secondary terminal script objects 83a and 83b and], respectively. As for the upstream terminal-block standup sections 51a and 51b, let the width method (drawing 10 vertical lay length) be the die length of the abbreviation one half of the width method (drawing 10 vertical lay length) of the hole 47 of the rectangle of the RO character-like core 73.

[0051] A rectangular projection (henceforth secondary projection 84a) is formed in the whole surface section (under drawing 10) in secondary terminal script object 83a, and, on the other hand, the slot on the configuration in alignment with secondary projection 84a (henceforth secondary slot 85a) is formed in the section (on drawing 10) at it. Corresponding to secondary projection 84a and secondary slot 85a, secondary projection 84b and secondary slot 85b are prepared in secondary terminal script object 83b.

[0052] Processus-accessorius (projection for fitting) 86a for upstream fitting which fits into the slot 76 for fitting of the RO character-like core 73 is prepared in the both-sides section [upstream projection 80a (on drawing 1010) near near the primary gutter 81a (under drawing 10)] of the part by the side of upstream terminal-block standup section 46a in primary side edge child script object 79a. Moreover, processus-accessorius (projection for fitting) 86b for upstream fitting which fits into the slot 76 for fitting of the RO character-like core 73 is similarly prepared in the both-sides section [primary gutter 81a (under drawing 10) near near the upstream projection 80a (on drawing 10)] of the part by the side of upstream terminal-block standup section 46b in primary side edge child script object 79b.

[0053] Processus-accessorius (projection for fitting) 87a for secondary fitting which fits into the slot 76 for fitting of the RO character-like core 73 is prepared in the both-sides section [secondary slot 85a (on drawing 1010) near near the secondary projection 84a (under drawing 10)] of the part by the side of secondary terminal-block standup section 51a in secondary terminal script object 83a. Moreover, processus-accessorius (projection for fitting) 87b for secondary fitting which fits into the slot 76 for fitting of the RO character-like core 73 is similarly prepared in the both-sides section of the part by the side of secondary terminal-block standup section 51b in secondary terminal script object 83b.

[0054] 1st bobbin 74a and 2nd bobbin 74b of a gestalt of the 2nd operation are combined and unified where the secondary coils 25a and 25b are wound, respectively. In this case, when primary gutter 81 of 2nd bobbin 74b b and secondary projection 84b fit in, 1st bobbin 74a and 2nd bobbin 74b are combined and united with upstream projection 80 of 1st bobbin 74a a, and secondary slot 85a,

respectively. And the upstream coil 24 is wound around upstream coil section 35 of upstream coil section 35a and 2nd bobbin 74b of 1st bobbin 74a unified in this way b in common. Under the present circumstances, I configuration core 23b inserted in core insertion hole 55 of I configuration core 23a [which is inserted in core insertion hole 55 of 1st bobbin 74a a] and 2nd bobbin 74b b is being positioned and fixed to the RO character-like core 73 by the part equivalent in electromagnetism through the sheet 27 of said nonmagnetic material so that it may have an equal property in the upstream coil 24 and mutual and may combine with them in electromagnetism.

[0055] Said 1st bobbin 74a and 2nd bobbin 74b which were unified are in the condition equipped with the upstream coil 24 mentioned above, the coil 42 (refer to drawing 7) for feedback, the secondary coils 25a and 25b, and I configuration cores 23a and 23b, and are being fixed to the RO character-like core 73. In this case, 1st bobbin 74a and 2nd bobbin 74b make one slot 30 (drawing 10 right-hand side) for terminal-block fitting carry out fitting of the upstream terminal blocks 78a and 78b like the gestalt of said 1st operation, and make the slot 30 (drawing 11 left-hand side) for terminal-block fitting on another side carry out fitting of the secondary terminal blocks 82a and 82b.

[0056] Furthermore, with the gestalt of the 2nd operation, processus-accessorius 87b for secondary fitting of processus-accessorius 87 for secondary fitting a and secondary terminal script object 83b of processus-accessorius 86 for upstream fitting of primary side edge child script object 79a a, processus-accessorius 86 for upstream fitting of primary side edge child script object 79b b, and secondary terminal script object 83a fits into the slot 76 for fitting of the RO character-like core 73. Moreover, processus-accessorius 86b for upstream fitting of processus-accessorius 86 for upstream fitting a and primary side edge child script object 79b of primary side edge child script object 79a is joined. It fits into the slot 77 for short side part central fitting, processus-accessorius 87b for secondary fitting of processus-accessorius 87 for secondary fitting a and secondary terminal script object 83b of secondary terminal script object 83a is joined similarly, and fitting is carried out to the slot 77 for short side part central fitting. As mentioned above, fitting of 1st bobbin 74a and 2nd bobbin 74b which were unified is carried out, and they make the sheet 27 of nonmagnetic material intervene between two I configuration cores 23a and 23b and the RO character-like core 73, and are being fixed to the RO character-like core 73 by adhesives.

[0057] With the gestalt of this 2nd operation, immobilization to the RO character-like core 73 of unified 1st bobbin 74a and 2nd bobbin 74b Further it is not only carried out like the gestalt of said 1st operation by fitting to one slot 30 (drawing 11 right-hand side) for terminal-block fitting of the upstream terminal blocks 78a and 78b, and fitting to the slot 30 (drawing 11 left-hand side) for terminal-block fitting of another side of the secondary terminal blocks 82a and 82b, but Processus-accessorius 86 for upstream fitting a, Fitting to the slot 76 for fitting of processus-accessorius 86 for upstream fitting b, processus-accessorius 87 for secondary fitting a, and processus-accessorius 87b for secondary fitting, And since it is carried out by fitting to the slot 77 for short side part central fitting of the joined processus accessoriis 86a and 86b for upstream fitting, and fitting to the joined slot 77 for short side part central fitting of the processus accessoriis 87a and 87b for secondary fitting, it can fix more firmly. Moreover, with the gestalt of the 2nd operation, 1st bobbin 74a and 2nd bobbin 74b are made into the same configuration, can be manufactured using the same mold mold, can hold down the part manufacturing cost, and can attain cheap-ization of equipment.

[0058] In addition, when adhesives perform immobilization to the RO character-like core 73 of unified 1st bobbin 74a and 2nd bobbin 74b, you may make it use the RO character-like core 90 constituted as it replaced with the RO character-like core 73 (drawing 11 R>1) of the gestalt of the 2nd operation, for example, was shown in drawing 14 (gestalt of the 3rd operation). Thickness is made thin and this RO character-like core 90 is constituted so that the surface part by the side of the slot 30 for terminal-block fitting of the RO character-like core 73 (under drawing 11) may be abolished, and it combines with abolition of the slot 30 for terminal-block fitting, the notch 75 (drawing 11) of the RO character-like core 73 is also abolished, and the configuration is simplified.

[0059] With the gestalt of this 3rd operation, 1st bobbin 74a (refer to drawing 10) and 2nd bobbin 74b (refer to drawing 10) which were unified, and the RO character-like core 90 are joined. As mentioned above, while it is fixed by adhesives, both immobilization Fitting to the slot 76 for fitting of processus-accessorius 86 for upstream fitting a, processus-accessorius 86 for upstream fitting b, processus-accessorius 87 for secondary fitting a, and processus-accessorius 87b for secondary fitting

(refer to drawing 10 - drawing 13), And it is carried out by fitting (refer to drawing 10 - drawing 13) to the slot 77 for short side part central fitting of the joined processus accessorius 86a and 86b for upstream fitting, and fitting to the joined slot 77 for short side part central fitting of the processus accessorius 87a and 87b for secondary fitting. With the gestalt of this 3rd operation, as compared with the RO character-like core 73 (drawing 11) of the gestalt of the 2nd operation, the RO character-like core 90 abolishes the slot 30 (drawing 11) for terminal-block fitting, and a notch 75 (drawing 11), and is simple [that configuration]. Therefore, it is easy to produce the RO character-like core 90, and improvement in productivity can be aimed at.

[0060] Next, the inverter transformer concerning the gestalt of the 4th operation of this invention is explained based on drawing 15 thru/or drawing 19. In addition, a sign equivalent to drawing 1 thru/or drawing 14 and drawing 22 thru/or drawing 25 about drawing 1 thru/or drawing 14 and drawing 22 thru/or a part equivalent to drawing 25, and a member is attached, and the explanation is omitted suitably.

[0061] It had the RO character-like core 91 of the structure which abolished the slot 76 for fitting which the RO character-like core 73 has as the gestalt of the 4th operation is replaced with the RO character-like core 73 as compared with the gestalt of said 2nd operation and it is shown in drawing 15 - drawing 17, Each of having formed the 1st and 2nd bobbin 92a and 92b, as it replaced with the 1st and 2nd bobbin 74a and 74b and was shown in drawing 15 and drawing 16, and the 1st and 2nd bobbin 92a and 92b As shown in drawing 16, drawing 18, and drawing 19 Having replaced with the processus accessorius 86a and 86b for upstream fitting of the 1st and 2nd bobbin 26a and 26b and the processus accessorius 87a and 87b for secondary fitting, and having formed the processus accessorius 93a and 93b for upstream fitting (projection for fitting) and the processus accessorius 94a and 94b for secondary fitting (projection for fitting) mainly differ.

[0062] As shown in drawing 15 and drawing 16, processus-accessorius 93a for upstream fitting is prepared in the both-sides section [upstream projection 80a (on drawing 16) near near the primary gutter 81a (under drawing 16)] of the part by the side of upstream terminal-block standup section 46a in primary side edge child script object 79a so that it may start on the drawing 16 space side front. Among processus-accessorius 93a for two upstream fitting, one thing (under drawing 16) becomes the outside of the RO character-like core 91, and the thing (on drawing 16) of another side can be inserted in the slot 77 for short side part central fitting of the RO character-like core 91, and it can attach it now on both sides of the RO character-like core 91 by both.

[0063] Processus-accessorius 93b for upstream fitting as well as processus-accessorius 93a for upstream fitting is prepared in the both-sides section of the part by the side of upstream terminal-block standup section 46b in primary side edge child script object 79b. Among processus-accessorius 93b for two upstream fitting, one thing (on drawing 16) becomes the outside of the RO character-like core 91, and the thing (under drawing 16) of another side can be inserted in the slot 77 for short side part central fitting of the RO character-like core 91, and it can attach it now on both sides of the RO character-like core 91 by both.

[0064] Processus-accessorius 94a for secondary fitting is prepared in the both-sides section [secondary slot 85a (on drawing 16) near near the secondary projection 84a (under drawing 16)] of the part by the side of secondary terminal-block standup section 51a in secondary terminal script object 83a so that it may start on the drawing 16 space side front. Among processus-accessorius 94a for two secondary fitting, one thing (under drawing 16) becomes the outside of the RO character-like core 91, and the thing (on drawing 16) of another side can be inserted in the slot 77 for short side part central fitting of the RO character-like core 91, and it can attach it now on both sides of the RO character-like core 91 by both.

[0065] Processus-accessorius 94b for secondary fitting as well as processus-accessorius 94a for secondary fitting is prepared in the both-sides section of the part by the side of secondary terminal-block standup section 51b in secondary terminal script object 83b. Among processus-accessorius 94b for two secondary fitting, one thing (on drawing 16) becomes the outside of the RO character-like core 91, and the thing (under drawing 16) of another side can be inserted in the slot 77 for short side part central fitting of the RO character-like core 91, and it can attach it now on both sides of the RO character-like core 91 by both.

[0066] 1st bobbin 74a and 2nd bobbin 74b which were unified make one slot 30 (drawing 17 right-

hand side) for terminal-block fitting carry out fitting of the upstream terminal blocks 78a and 78b like the gestalt of said 1st operation, and make the slot 30 (R> drawing 17 7 left-hand side) for terminal-block fitting on another side carry out fitting of the secondary terminal blocks 82a and 82b with the gestalt of the 4th operation.

[0067] Furthermore, with the gestalt of the 4th operation, the RO character-like core 91 of processus accessorius [the processus accessorius 93a and 93b for upstream fitting and] 94a and 94b for secondary fitting is pinched. this RO character-like core 91 -- inserting -- attaching -- and top Norikazu -- 1st bobbin 74a and 2nd bobbin 74b which were unified are being fixed to the RO character-like core 91 by fitting to the slot 30 for terminal-block fitting of the side [degree] terminal blocks 78a and 78b and the secondary terminal blocks 82a and 82b. The part which pinches the RO character-like core 91 of processus accessorius [the processus accessorius 93a and 93b for upstream fitting and] 94a and 94b for secondary fitting also in this case as compared with the gestalt of the 1st operation, unified 1st bobbin 74a, and 2nd bobbin 74b can be more firmly fixed to the RO character-like core 91.

[0068] In addition, you may make it use the RO character-like core 95 constituted as it replaced with the RO character-like core 91 (drawing 17) of the gestalt of the 4th operation, for example, was shown in drawing 20 (gestalt of the 5th operation). Thickness is made thin, this RO character-like core 95 is constituted so that the surface part by the side of the slot 30 for terminal-block fitting of the RO character-like core 91 (under drawing 17) may be abolished, and the slot 30 for terminal-block fitting and a notch 75 (drawing 17) are also abolished, and the configuration is simplified.

[0069] With the gestalt of this 5th operation, 1st bobbin 74a (refer to drawing 10) and 2nd bobbin 74b (refer to drawing 10) which were unified, and the RO character-like core 95 are joined. While it is fixed by adhesives, both immobilization The processus accessorius 93a and 93b for upstream fitting and the processus accessorius 94a and 94b for secondary fitting can fix more firmly the part whose RO character-like core 95 is pinched, unified 1st bobbin 74a, and 2nd bobbin 74b to the RO character-like core 95. Moreover, as compared with the RO character-like core 91 (drawing 17) of the gestalt of the 4th operation, the RO character-like core 95 abolishes the slot 30 (drawing 17) for terminal-block fitting, and a notch 75 (drawing 17), and is simple [the configuration]. Therefore, it is easy to produce the RO character-like core 95, and improvement in productivity can be aimed at.

[0070] Next, the inverter transformer concerning the gestalt of the 6th operation of this invention is explained based on drawing 21 . A sign equivalent to drawing 1 thru/or drawing 20 and drawing 22 thru/or drawing 25 about drawing 1 thru/or drawing 20 and drawing 22 thru/or a part equivalent to drawing 25, and a member is attached, and the explanation is omitted suitably. In addition, in drawing 21, the publication of the upstream projections 48a and 48b, the primary gutters 49a and 49b, the secondary projections 52a and 52b, the secondary slots 53a and 53b, etc. is omitted for convenience.

[0071] As compared with the gestalt of said 1st operation, the gestalt of the 6th operation was replaced with I configuration cores 23a and 23b, and is equipped with I configuration cores 96a and 96b. I configuration core 96a consists of I configuration core body 97a prolonged in the shape of a straight line, and core [it was connected / core / a / I configuration core body 97/ so that the configuration where it combined with I configuration core body 97a might make an abbreviation L typeface] L typeface section (flection) 98a. On the other hand, although opening of the core insertion hole 55a prepared in 1st bobbin 26a is carried out by part for the top-face flank of primary side edge child script object 45a (on drawing 21), as compared with the thing of the gestalt of the 1st operation being constant width, an edge side is widened and the opening partial 99a is making the abbreviation L typeface. And fitting of the core L typeface section 98a is carried out to opening partial 99a.

[0072] I configuration core 96b as well as I configuration core 96a consists of I configuration core body 97b and core L typeface section (flection) 98b. Moreover, opening partial 99b is formed in 2nd bobbin 26b like opening partial 99of 1st bobbin 26a a, and it fits into core L typeface section 98b.

[0073] With the gestalt of this 6th operation, I configuration cores 96a and 96b are equipped with the core L typeface sections 98a and 98b, it is made dense by the upstream about magnetic association with the RO character-like core 21 (refer to drawing 1), and the amount of openings with the RO character-like core 21 is adjusted only by secondary, and a leakage inductance can become a desired

value and can attain simplification of adjustment of a leakage inductance.

[0074]

[Effect of the Invention] Though an upstream coil is common, since it has two or more secondary coils which became independent, respectively according to invention given in either from claim 1 to claim 6 Installation of two or more inverter transformers needed with the conventional technique when turning on two or more cathode-ray tubes (CFL), Or without installing two or more ballast capacitors, two or more cathode-ray tubes (CFL) can be turned on to coincidence, and the simplification and cheap-izing of equipment can be attained.

[0075] Moreover, while the part and components mark to which one outside core common to two or more inside cores (secondary coil) can be prepared, two or more cathode-ray tubes (CFL) can be turned on as compared with the case where two or more outside cores are prepared corresponding to two or more inside cores (secondary coil), and an outside core can be managed with one piece are reduced, the miniaturization of equipment can be attained, as a result cheap-ization of equipment can be attained.

[0076] According to invention according to claim 2, fitting of a projection and the slot can be carried out, two or more bobbins can be unified, and positive immobilization and improvement in assemblability can be aimed at. According to invention according to claim 3, a core gutter can be made to be able to carry out fitting of a part of upstream terminal block of two or more bobbins unified in an outside core and two or more bobbins, and a part of secondary terminal block, it can unify, and positive immobilization and improvement in assemblability can be aimed at. According to invention according to claim 4, two or more bobbins fit into the lateral part of the slot for fitting which the projection for fitting prepared in the upstream terminal block and a secondary terminal block formed in the outside core, or an outside core, and are held certainly and firmly at an outside core.

[0077] According to invention according to claim 5, the inside core of two or more abbreviation I configurations equips the end section with a flection, and is related with magnetic association with two or more inside cores and the outside core of the shape of a character of abbreviation RO. It is able to make it dense by the upstream, to adjust the amount of openings with the outside core of the shape of a character of abbreviation RO only by secondary, and to make it for a leakage inductance to become a desired value, and, thereby, simplification of adjustment of a leakage inductance can be attained. According to invention according to claim 6, since two or more bobbins make the same configuration, they can manufacture two or more bobbins using the same mold mold, can hold down the part manufacturing cost, and can attain cheap-ization of equipment.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the decomposition perspective view showing typically the inverter transformer concerning the gestalt of the 1st operation of this invention.

[Drawing 2] It is the perspective view showing typically the inverter transformer of drawing 1 in the condition of having been attached.

[Drawing 3] It is the top view showing the inverter transformer of drawing 1.

[Drawing 4] It is the perspective view showing the KO character-like core of drawing 1.

[Drawing 5] It is the side elevation of B view of drawing 3.

[Drawing 6] It is the sectional view which meets the A-A'line of drawing 3.

[Drawing 7] It is the circuit diagram which connected CFL to the inverter transformer of drawing 1.

[Drawing 8] It is drawing showing the equal circuit of the inverter transformer of drawing 1.

[Drawing 9] It is the perspective view showing the inverter transformer concerning the gestalt of the 2nd operation of this invention.

[Drawing 10] It is the top view showing the inverter transformer of drawing 9.

[Drawing 11] It is the perspective view showing the KO character-like core of drawing 9.

[Drawing 12] It is the side elevation of B view of drawing 10.

[Drawing 13] It is the sectional view which meets the A-A'line of drawing 10.

[Drawing 14] It is the perspective view showing other KO character-like cores (gestalt of the 3rd operation) replaced with the KO character-like core of drawing 9.

[Drawing 15] It is the perspective view showing the inverter transformer concerning the gestalt of the 4th operation of this invention.

[Drawing 16] It is the top view showing the inverter transformer of drawing 15.

[Drawing 17] It is the perspective view showing the KO character-like core of drawing 15.

[Drawing 18] It is the side elevation of B view of drawing 16.

[Drawing 19] It is the sectional view which meets the A-A'line of drawing 16.

[Drawing 20] It is the perspective view showing other KO character-like cores (gestalt of the 5th operation) replaced with the KO character-like core of drawing 15.

[Drawing 21] It is the decomposition perspective view showing typically the inverter transformer concerning the gestalt of the 6th operation of this invention.

[Drawing 22] It is drawing showing the equal circuit of an example of the inverter transformer of the conventional open magnetic circuit structure.

[Drawing 23] It is the top view showing typically an example of the inverter transformer of open magnetic circuit structure using I configuration core.

[Drawing 24] It is the decomposition perspective view showing an example of the inverter transformer of the conventional closed magnetic circuit structure.

[Drawing 25] It is drawing showing the circuitry in the case of using a ballast capacitor to the inverter transformer of closed magnetic circuit structure.

[Description of Notations]

20 Inverter Transformer

21 RO Character-like Core (Outside Core)

23a, 23b I configuration core (inside core)

24 Upstream Coil

25a, 25b Secondary coil
26a The 1st bobbin
26b The 2nd bobbin
30 Slot for Terminal-Block Fitting
38a, 38b Upstream terminal block
39a, 39b Secondary terminal block
48a, 48b Upstream projection
49a, 49b Primary gutter
52a, 52b Upstream projection
53a, 53b Primary gutter

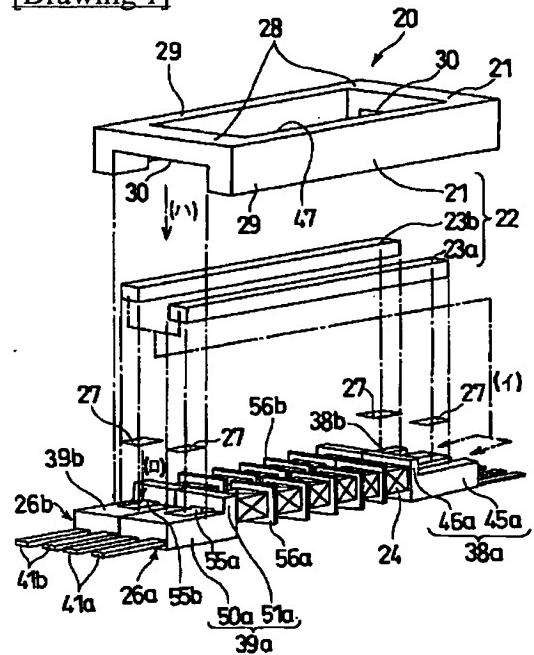
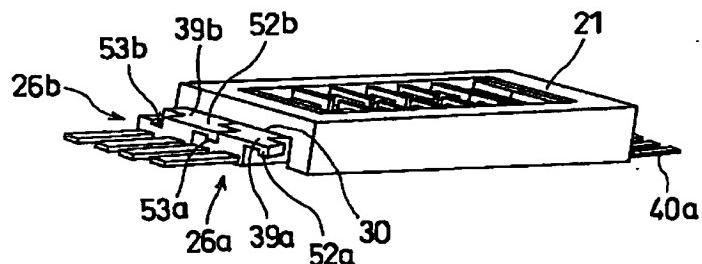
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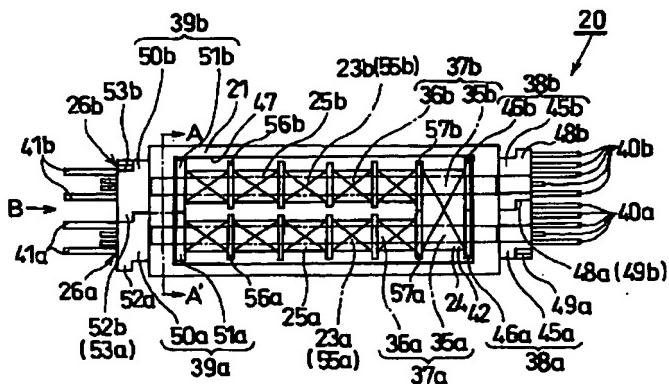
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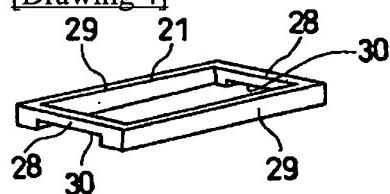
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DRAWINGS

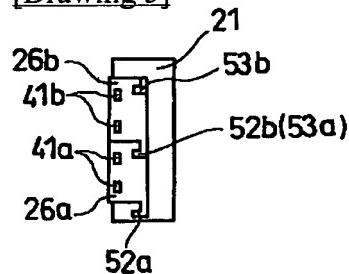
[Drawing 1]**[Drawing 2]****[Drawing 3]**



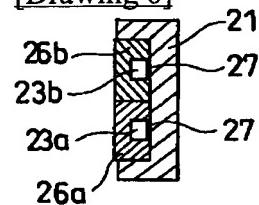
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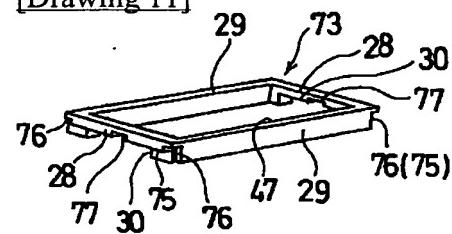
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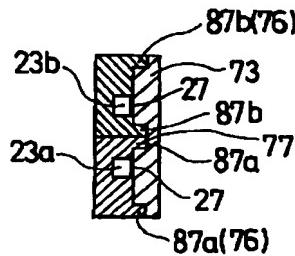
[Drawing 6]



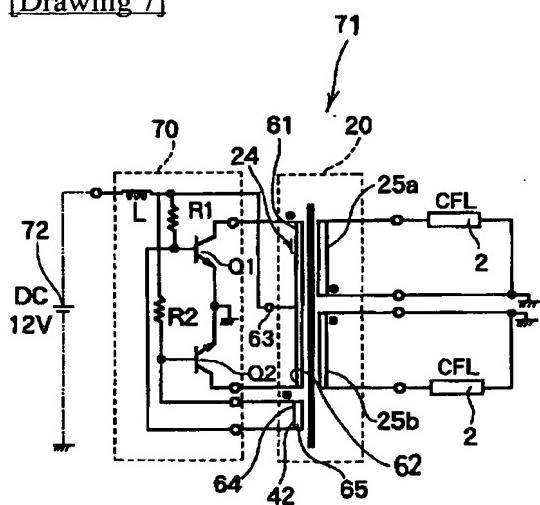
[Drawing 11]



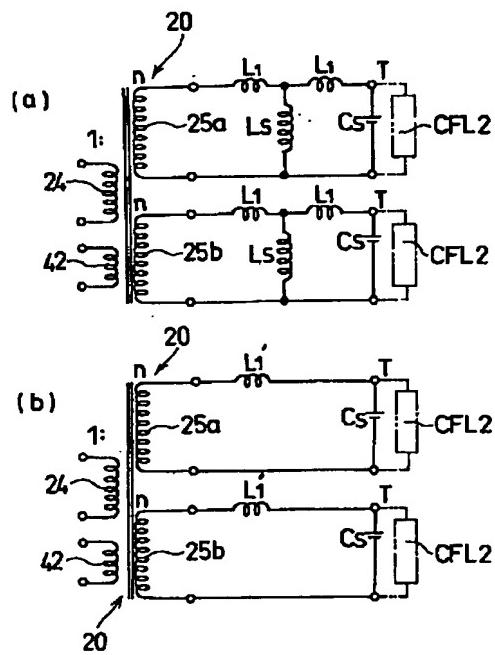
[Drawing 13]



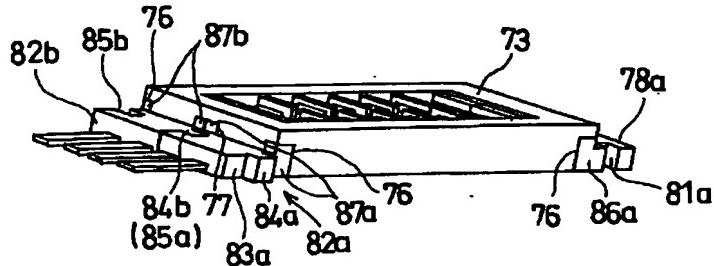
[Drawing 7]



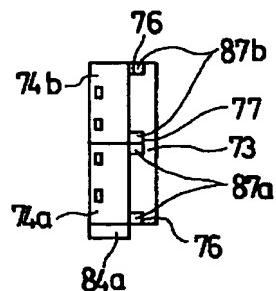
[Drawing 8]



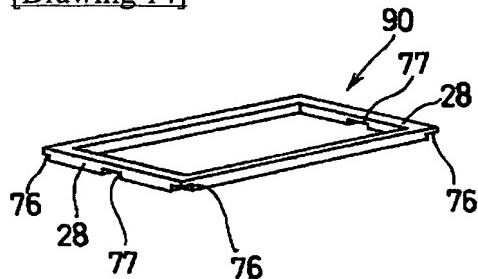
[Drawing 9]



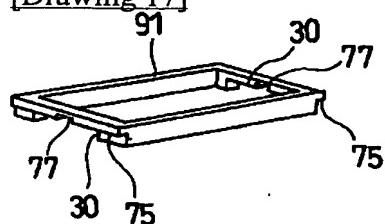
[Drawing 12]



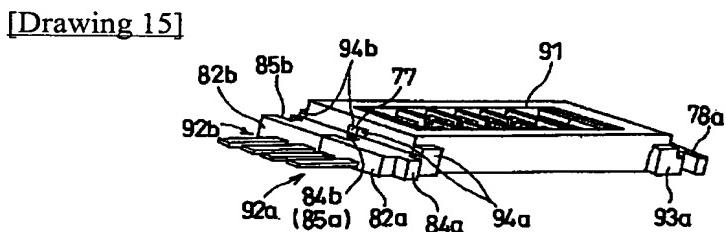
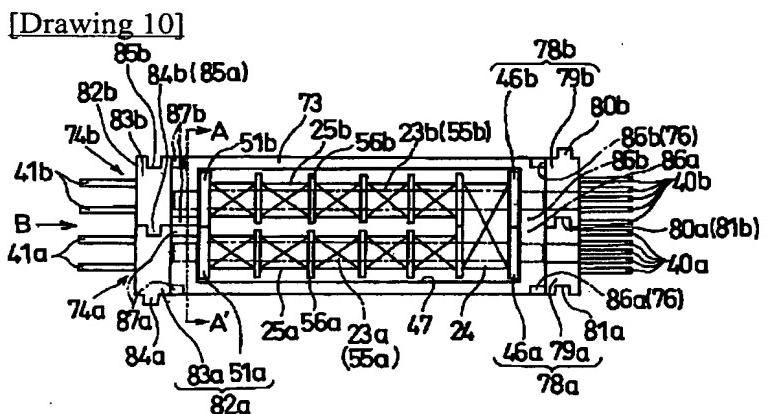
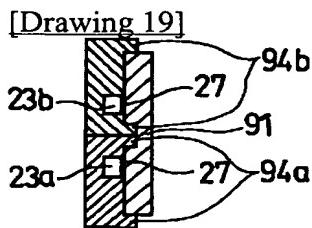
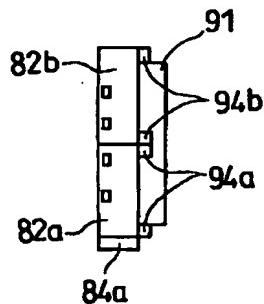
[Drawing 14]



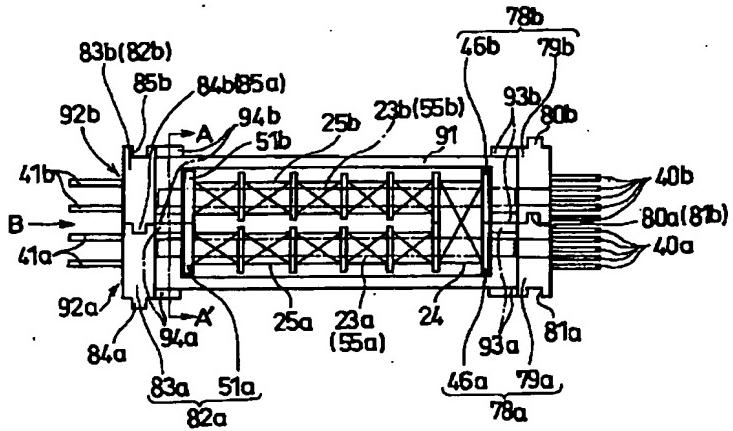
[Drawing 17]



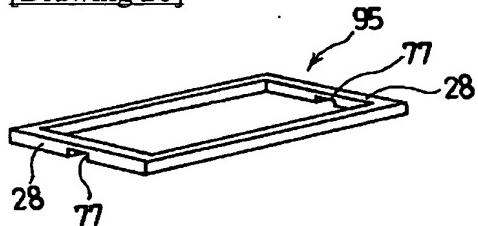
[Drawing 18]



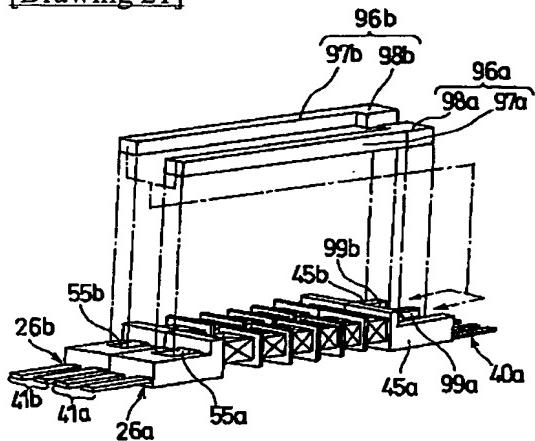
[Drawing 16]



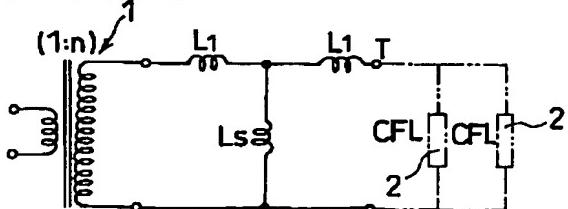
[Drawing 20]



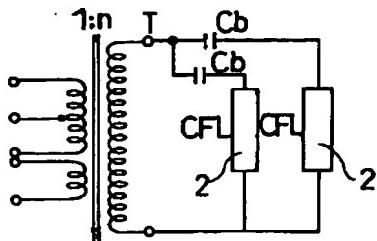
[Drawing 21]



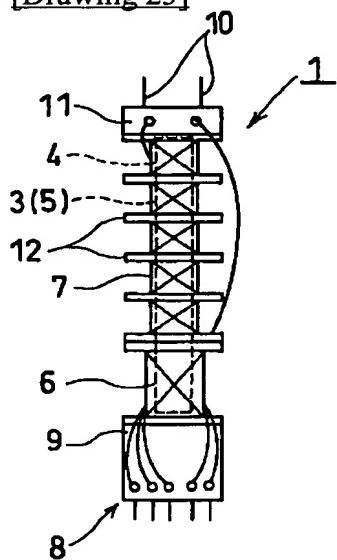
[Drawing 22]



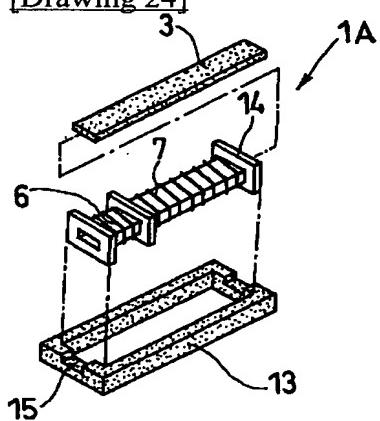
[Drawing 25]



[Drawing 23]



[Drawing 24]



[Translation done.]